

2013

**Groundwater Monitoring  
Report**

**South Charleston Facility**

**South Charleston, West Virginia**

Prepared for

**Union Carbide Corporation**

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Prepared by

**CH2MHILL®**



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# Acronyms and Abbreviations

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µg/L	micrograms per liter
AS/SVE	air sparge/soil vapor extraction
DCA	dichloroethane
DCP	dichloropropane
facility	South Charleston Facility
LTM	long-term monitoring
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RFI	Resource Conservation and Recovery Act facility investigation
RSL	regional screening level
SVOC	semivolatile organic compound
TCE	trichloroethene
UCC	Union Carbide Corporation
USEPA	United States Environmental Protection Agency
VI	vapor intrusion
VOC	volatile organic compound
WVDEP	West Virginia Department of Environmental Protection



## **SECTION 1**

# **Introduction and Sitewide Monitoring Overview**

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## **1.1 Introduction**

Union Carbide Corporation (UCC) is managing environmental site investigation and remediation activities at its South Charleston Facility in South Charleston, West Virginia (hereafter referred to as the “facility”) in accordance with the U.S. Environmental Protection Agency (USEPA) Resource Conservation and Recovery Act (RCRA) under a USEPA Region 3 Facility Lead Agreement, dated December 15, 1999. In 2007, UCC began a facility-wide semiannual groundwater monitoring program to supplement RCRA facility investigation (RFI) activities. In August 2011, the sampling frequency changed to a 9-month cycle, following approval by USEPA at a June 2011 meeting.

During a June 2013 meeting, UCC and USEPA agreed upon a revised approach to groundwater data reporting. Rather than submitting reports for the entire facility, the annual groundwater reports will focus only on the areas of the facility with remedies in place. For 2013, that includes the Building 82 Remediation Area, the Middle Mainland Remediation Area, and the Chlorhydrin Remediation Area.

## **1.2 Objectives**

The objective of the groundwater monitoring is to evaluate the performance of the individual remedies in place at the facility relative to their objectives.

## **1.3 Background**

To facilitate management of the facility for investigation and remedy selection, the facility has been divided into 10 “remediation areas,” five on the Mainland and five on Blaine Island (see **Figure 1-1**). The three areas with remedies in place in 2013 are all on the Mainland and include the Building 82 Remediation Area, the Middle Mainland Remediation Area, and the Chlorhydrin Remediation Area.

### **1.3.1 Building 82 Remediation Area**

The Building 82 Remediation Area is located in the southwestern portion of the facility. It was used for administrative offices and was also occupied by a UCC machine shop and a synthetic Dynel® fiber manufacturing facility (located in the southeastern part of the remediation area about 100 feet south of former Building 603). The property is currently vacant and the buildings have been demolished. More information on the history and environmental conditions at the Building 82 Area is provided in the *Building 82 Area Remedial Approach Report* (CH2M HILL 2012), along with an evaluation of remedial alternatives and the selected remedy, which includes institutional controls and long-term groundwater monitoring.

USEPA approved the *Building 82 Area Remedial Approach* report in December 2012. The selected remedy was incorporated into a Statement of Basis by the West Virginia Department of Environmental Protection (WVDEP), and the Final Decision was issued in 2013 following a public comment period (WVDEP 2013).

### **1.3.2 Middle Mainland Remediation Area**

The Middle Mainland Remediation Area includes Buildings 301/303, 307, 323, and surrounding areas. It has been used primarily for chemical mixing and shipping in the area now occupied by Building 301/303, and for maintenance shops in the area presently occupied by Building 307. Building 301/303 is currently used for shipping and is designated as the Chemical Mixing Unit, while Building 307 is presently used for administrative offices. More information on the history and environmental conditions at the Middle Mainland Area is provided in the *Middle Mainland Area Remedial Approach Report* (CH2M HILL 2013). This report also presents an evaluation of remedial alternatives and the selected remedy, which includes institutional controls and long-term groundwater monitoring.

The *Middle Mainland Remediation Area Remedial Approach* report was submitted to USEPA in March 2013 (CH2M HILL 2013). USEPA verbally approved the selected remedy at a June 2013 meeting, noting that final, written approval was pending final approval of the facility soil and groundwater human health risk assessment report (CH2M HILL 2013).

### **1.3.3 Chlorhydrin Remediation Area**

The Chlorhydrin Remediation Area is in the eastern portion of the Mainland and includes the former Building 42 complex and current Building 300 (**Figure 1-1**). The name is derived from the former Chlorhydrin Unit that operated in Building 42 from 1925 to 1957.

1,2-Dichloroethane (1,2-DCA), 1,2-dichloropropane (1,2-DCP), bis(2-chloroethyl)ether, and bis(2-chloroisopropyl)ether were produced as byproducts of the chlorhydrin process. The Chlorhydrin Unit also included a tank farm northeast of Building 42 and a shipping area where a railroad spur entered the unit. Most recently, Building 42 and surrounding ancillary facilities supported the Alkyl Amines Unit, where operations are not believed to be contributors to contamination in environmental media. Production operations were discontinued in 2008, and demolition of this unit, including Building 42, was completed in early 2009.

More information on the history and environmental conditions at the Chlorhydrin Remediation Area is provided in the *Chlorhydrin Area Remedial Approach Report* (CH2M HILL 2010). This report also presents the selected remedy for this area of the facility, which consists of an air sparge/ soil vapor extraction (AS/SVE system) comprised of 31 AS wells completed just above bedrock, 38 SVE wells screened in the fractured silt/clay soils, and 22 SVE wells screened in the underlying vadose zone to collected vapor generated by the air sparging. USEPA approved the *Chlorhydrin Remediation Area Remedial Approach Report* in October 2010. The AS/SVE system was constructed in 2010-2011 and became operational in mid-2011. The system will operate to remediate the source area and groundwater in the immediate vicinity to concentrations that do not result in unacceptable discharge of groundwater to the Kanawha River.

## 1.4 Facility-Wide Groundwater Flow Evaluation

To evaluate the groundwater flow at the facility, water levels were measured in monitoring wells before collecting groundwater samples during the sampling events. Measured water levels were then subtracted from the surveyed top-of-casing elevations to determine the groundwater elevations. The measurements were organized according to the well classification system, as defined in the 2007 semiannual groundwater monitoring report (CH2M HILL 2007), and used to prepare potentiometric surface maps to evaluate groundwater flow. This classification is shown in parentheses beside each well identification on the potentiometric surface maps. Zone classifications applicable to this report are numerical, as defined below:

- 2 – Well is screened in shallow alluvium (top of screen above historical water table depth and bottom of screen within saturated alluvium).
- 3 – Well is screened in intermediate alluvium (top and bottom of screen depths within the saturated alluvium).
- 4 – Well is screened in deep alluvium (bottom screen depth is at or near the top of bedrock).

A potentiometric surface map was made for the shallow portion of the aquifer, i.e., wells classified as “2” (**Figures 3-1** and **3-3** for the February and November 2013 event, respectively) and for intermediate and deep portions of the aquifer, i.e., wells classified as “3” and “4” (**Figures 3-2** and **3-4** for the February and November 2013 events, respectively). The following sections provide general observations from these maps. Groundwater elevations were not included for wells that either could not be located or had not yet been surveyed.

Groundwater on the Mainland generally flows north to northeast, with a low gradient toward the Kanawha River. This trend is apparent in both the shallow and deep portions of the alluvial aquifer. On Blaine Island, the groundwater flows radially from the center of the island.

## 1.5 2013 Groundwater Sampling

Groundwater sampling was completed in February and November 2013. The groundwater samples collected in February 2013 were analyzed for volatile organic compounds (VOCs) and the samples collected in November 2013 were analyzed for VOCs and semivolatile organic compounds (SVOCs). The VOCs and SVOCs analyzed for these samples are from the facility target analyte list, which represents the list of constituents potentially related to facility operations, as described in the sitewide RFI work plan (CH2M HILL 2006).

Sampling at the three remediation areas of focus in this report include the following:

- Four wells in the Building 82 Remediation Area during both sampling events;
- Six wells in the Middle Mainland Remediation Area during the February 2013 event, and four wells during the November 2013 event; and

- Sixteen wells in the Chlorhydrin Remediation Area during the February 2013 event, and nine wells during the November 2013 event.

The number of wells sampled in each round may vary based on continued efforts to optimize the monitoring program. Results for each remediation area are presented in subsequent sections of this report, with section for each Remediation Area. **Appendix A** contains the data quality evaluation reports and laboratory analytical data reports (on compact disc). Groundwater constituents that are present at the remediation areas in the highest concentrations and are most likely to result in the need for remediation relative to the facility remediation action objectives (RAOs) are termed “remediation driver constituents.” The selected remediation driver constituents vary by remediation area, and are the focus of evaluation in this report.

RAOs were established for the facility based upon groundwater discharge to the Kanawha River and potential vapor intrusion (VI) risk. As a result, data presented herein are detailed in comparison to the Kanawha River pore water cleanup level (CH2M HILL 2009). The VI pathway is evaluated in the annual building inventory process (CH2M HILL 2014, most recently); therefore, comparisons presented herein are for reference only.

Isoconcentration maps were developed, as appropriate, for constituents that are remediation area-specific remediation drivers.

- Two sets of contours represent exceedances of the two screening criteria for individual constituents. As previously discussed, the two screening criteria are the Kanawha River pore water cleanup levels and the groundwater regional screening level (RSL) protective of industrial indoor air (USEPA 2011). Note that the pore water cleanup levels are not pertinent to the Building 82 Area because it is not adjacent to the Kanawha River.
- A third set of contours was used to illustrate the areas in which the highest concentrations were detected for each constituent. This contour represents detections greater than 1,000 micrograms per liter ( $\mu\text{g}/\text{L}$ ), or 10,000  $\mu\text{g}/\text{L}$ , depending on the constituent mapped and the respective concentrations. The values chosen for these contours do not represent screening values and are only meant to highlight the areas of highest concentration. **Figures 3-7 through 3-12** and **Figures 3-14 through 3-21** present the isoconcentration maps for selected constituents.

To evaluate plume stability/migration, chemical time series plots were developed for each well in the three remediation areas (**Appendix B**). These plots show analytical results for the key constituents starting with the first RFI activities for the facility in 2002 through the 2013 events.

## SECTION 2

# Building 82 Area Groundwater Results

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## 2.1 Building 82 Remediation Area

Four monitoring wells are included in the long-term monitoring (LTM) well network for the Building 82 Remediation Area. The locations of the monitoring wells are shown on **Figure 3-5**, and the results of the groundwater sampling are presented on **Table 3-1**. For the Building 82 Area, the compounds that are considered “remediation driver constituents” include those that have been detected above the VI residential screening levels: carbon tetrachloride, chloroform, and vinyl chloride. The primary VOC detected in the Building 82 Remediation Area is carbon tetrachloride, which was detected in the westernmost three wells (PZ041, PZ040, and MW28D). The highest concentrations occur in PZ041 at the western end of the remediation area. Chloroform and carbon tetrachloride were detected in monitoring wells MW028D and PZ041, and carbon tetrachloride was detected in PZ040 at concentrations similar to past sampling events. Vinyl chloride was detected in PZ039 at 2.53 µg/L in the February 2013 sampling event, but it was not previously detected in this well.

Chlorobenzene, 1,2-dichlorobenzene, and 1,4-dichlorobenzene were detected in all of the November 2013 groundwater samples at concentrations less than 5 µg/L. These chlorinated benzenes had not been previously detected in any of the wells in the Building 82 Remediation Area. Most of the chlorinated benzenes were flagged with a “B” qualifier during data validation to indicate these analytes were also present in a method blank or calibration blank. The November 2013 groundwater sampling occurred in the same period as groundwater sampling in the Chlorobenzene Remediation Area, using some of the same sampling equipment. Because chlorinated benzenes were never detected in the Building 82 Remediation Area wells prior to November 2013, it is likely that the detections resulted from carry-over contamination in the sampling pumps that were used for both areas.

The chemical time series plots in **Appendix B** indicate that all three wells show decreasing or stable concentration trends since 2010. Therefore, the selected remedy is appropriate, and LTM will continue.



## SECTION 3

# Middle Mainland Remediation Area

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The Middle Mainland Remediation Area wells sampled in 2013 are shown on **Figure 3-6**. The results of the groundwater sampling are presented on **Table 3-2**. As specified in the Middle Mainland Remediation Approach Report (CH2M HILL 2013), four existing wells and four new wells are to comprise the LTM network:

- Impacted wells – PZ031, three new wells;
- Sentinel wells – PZ032, MW027, MW037, and one new well.

Three of the four new monitoring wells were installed in December 2013 and were not sampled in 2013. The location for the fourth well was not accessible in December and will be installed in 2014. The new wells will be sampled during the 2014 sampling event. The four existing wells in the LTM network were sampled in addition to wells PZ030 and MW038.

The remediation driver constituents observed in Middle Mainland Remediation Area include benzene, 1,2-DCA, and trichloroethene (TCE). Isoconcentration maps for these constituents are presented on **Figures 3-7 through 3-12**. The following observations describe the physical and chemical properties of the Middle Mainland plume:

- PZ031 is the monitoring location nearest the center of the Middle Mainland plume. Benzene decreased between 2003 and 2005 in PZ031, and has since fluctuated at lower concentrations. Concentrations of other constituents have also fluctuated.
- Constituent concentrations in the sentinel monitoring wells (PZ032, MW027, MW037, PZ030, and MW038) show stable or decreasing trends, with the exception of PZ032.
- PZ032 showed a sudden rise in TCE (from 1.77 to 115 µg/L) and benzene (from 10.7 to 120 µg/L) concentrations during the November 2013 sampling event. As shown on the chemical time series plot for PZ032 (**Appendix B**), benzene also spiked in 2007, and then dropped back to its previous lower concentration of approximately 10 µg/L, which suggests that these concentrations may drop back to previous levels during the next sampling event. This will continue to be monitored and evaluated in 2014.

Overall, groundwater monitoring results indicate that the selected remedy is appropriate, and LTM will continue.



## SECTION 4

# Chlorhydrin Remediation Area

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As discussed in Section 1.3.3, an AS/SVE system was installed in the Chlorhydrin Remediation Area in 2010-2011. The Chlorhydrin Remediation Area groundwater plume is the largest plume on the Mainland, and exhibits a broad range of constituents. The most important, remediation driver constituents include benzene, 1,2-DCP, TCE, and vinyl chloride. The Chlorhydrin Remediation Area wells sampled in 2013 are shown on **Figure 3-13**, and the results of the groundwater sampling are presented in **Table 3-3**. Isoconcentration maps for these constituents are presented on **Figures 3-13 through 3-21**. The concentration-time plots are presented in **Appendix B**. The following observations describe the physical and chemical properties of the Chlorhydrin Area groundwater plume:

- The 1,2-DCP concentrations at MW040 (adjacent to Building 8781) have shown a decreasing trend. Because 1,2-DCP is a component of the potential VI issues for Building 8781, the system is addressing the VI at Building 8781 by reducing concentrations in soil and groundwater.
- Concentrations of some VOCs at the southwest end of the plume have shown an increasing trend. For example, the vinyl chloride concentrations in well MW078 were less than 10,000 µg/L during sampling events from 2010 to 2012, but increased to 15,000 - 18,600 µg/L during the two 2013 sampling events. However, other VOCs in MW078 (1,2-DCP, benzene, and TCE) showed an increasing trend between 2010 and system startup in 2011, and then decreasing trends after startup.
- VOC concentrations in the middle of the plume (e.g., MW060, MW073, and MW074) show generally decreasing trends.
- MW067, which is located near the downgradient end of the plume, shows generally decreasing concentration trends for TCE and vinyl chloride, and fluctuating but stable trends for benzene and 1,2-DCP.

The groundwater monitoring data results are generally as expected. The Chlorhydrin Remediation Area AS/SVE system is expected to continue operating for the foreseeable future, and groundwater monitoring will continue.



## SECTION 5

# References

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## **Tables**

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TABLE 3-1

## Summary of Chemicals Detected in Groundwater: Site SCF - Building 82 Remediation Area

Analyte	Location Sample ID Sample Depth (ft) Sample Date Screening Level	MW028D		PZ039		PZ040		PZ041		
		MW028D-GW-022013	MW028D-GW-111113	PZ039-GW-022013	PZ039-GW-111113	PZ040-GW-022013	PZ040-GW-111113	PZ041-GW-022013	PZ041-GW-022013D	PZ041-GW-111113
		35 - 45	35 - 45	25.4 - 35.4	25.4 - 35.4	28.7 - 38.7	28.7 - 38.7	26.6 - 36.6	26.6 - 36.6	26.6 - 36.6
		2/20/2013	11/11/2013	2/20/2013	11/11/2013	2/20/2013	11/11/2013	2/20/2013	2/20/2013	11/11/2013
<b>SVOCs (ug/L)</b>										
2,4,5-Trichlorophenol	--	--	5.32 U	--	5.26 U	--	5.62 U	--	--	5.56 U
2,4,6-Trichlorophenol	--	--	5.32 U	--	5.26 U	--	5.62 U	--	--	5.56 U
2,4-Dichlorophenol	--	--	5.32 U	--	5.26 U	--	5.62 U	--	--	5.56 U
2,4-Dimethylphenol	--	--	5.32 U	--	5.26 U	--	5.62 U	--	--	5.56 U
2,4-Dinitrophenol	--	--	26.6 U	--	26.3 U	--	28.1 U	--	--	27.8 U
2,4-Dinitrotoluene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
2,6-Dinitrotoluene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
2-Chloronaphthalene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
2-Chlorophenol	--	--	5.32 U	--	5.26 U	--	5.62 U	--	--	5.56 U
2-Methylnaphthalene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
2-Methylphenol	--	--	5.32 U	--	5.26 U	--	5.62 U	--	--	5.56 U
2-Nitroaniline	--	--	26.6 UL	--	26.3 U	--	28.1 U	--	--	27.8 U
2-Nitrophenol	--	--	5.32 U	--	5.26 U	--	5.62 U	--	--	5.56 U
3,3'-Dichlorobenzidine	--	R	--	R	--	R	--	--	--	R
3-Methylphenol & 4-Methylphenol	--	--	10.6 U	--	10.5 U	--	11.2 U	--	--	11.1 U
3-Nitroaniline	--	--	26.6 UL	--	26.3 U	--	R	--	--	27.8 U
4,6-Dinitro-2-methylphenol	--	--	26.6 U	--	26.3 U	--	28.1 U	--	--	27.8 U
4-Bromophenyl phenyl ether	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
4-Chloro-3-methylphenol	--	--	5.32 U	--	5.26 U	--	5.62 U	--	--	5.56 U
4-Chloroaniline	--	--	21.3 UL	--	21.1 U	--	22.5 UL	--	--	22.2 U
4-Chlorophenyl phenyl ether	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
4-Nitroaniline	--	--	26.6 UL	--	26.3 U	--	R	--	--	27.8 U
4-Nitrophenol	--	--	26.6 U	--	26.3 U	--	28.1 U	--	--	27.8 U
Acenaphthene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Acenaphthylen	--	--	5.32 UL	--	5.26 U	--	5.62 UL	--	--	5.56 U
Anthracene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Benz(a)anthracene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Benz(a)pyrene	--	--	106 U	--	52.6 U	--	56.2 U	--	--	55.6 U
Benz(b)fluoranthene	--	--	106 U	--	52.6 U	--	56.2 U	--	--	55.6 U
Benz(g,h,i)perylene	--	--	106 U	--	52.6 U	--	56.2 U	--	--	55.6 U
Benz(k)fluoranthene	--	--	106 U	--	52.6 U	--	56.2 U	--	--	55.6 U
Bis(2-chloroethoxy) methane	--	--	5.32 UL	--	5.26 U	--	R	--	--	5.56 U
Bis(2-chloroethyl) ether	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Bis(2-chloroisopropyl) ether	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Bis(2-ethylhexyl) phthalate	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Butyl benzylphthalate	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Carbazole	--	--	21.3 UL	--	21.1 U	--	22.5 UL	--	--	22.2 U
Chrysene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Di-n-butylphthalate	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Di-n-octylphthalate	--	--	106 U	--	52.6 U	--	56.2 U	--	--	55.6 U
Dibenzo(a,h)anthracene	--	--	106 U	--	52.6 U	--	56.2 U	--	--	55.6 U
Dibenzofuran	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Diethyl phthalate	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Dimethyl phthalate	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Fluoranthene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Fluorene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Hexachlorobenzene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Hexachlorobutadiene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Hexachlorocyclopentadiene	--	--	5.32 UL	--	5.26 UL	--	5.62 UL	--	--	5.56 UL
Hexachloroethane	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Indeno(1,2,3-c,d)pyrene	--	--	106 U	--	52.6 U	--	56.2 U	--	--	55.6 U
Isophorone	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
n-Nitrosodi-n-propylamine	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
n-Nitrosodiphenylamine	--	--	5.32 UL	--	5.26 U	--	5.62 UL	--	--	5.56 U
Naphthalene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Nitrobenzene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Pentachlorophenol	--	--	26.6 U	--	26.3 U	--	28.1 U	--	--	27.8 U
Phenanthrene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
Phenol	--	--	5.32 U	--	5.26 U	--	5.62 U	--	--	5.56 U
Pyrene	--	--	5.32 UL	--	5.26 U	--	5.62 U	--	--	5.56 U
<b>VOCs (ug/L)</b>										
1,1,1-Trichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,4-Trichlorobenzene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	--	1 U	2.89 B	1 U	1.35	1 U	1.47	1 U	1 U	3.55 B



TABLE 3-1  
Summary of Chemicals Detected in Groundwater: Site SCF - Building 82 Remediation Area

Analyte	Location Sample ID Sample Depth (ft) Sample Date Screening Level	MW028D		PZ039		PZ040		PZ041		
		MW028D-GW-022013	MW028D-GW-111113	PZ039-GW-022013	PZ039-GW-111113	PZ040-GW-022013	PZ040-GW-111113	PZ041-GW-022013	PZ041-GW-022013D	PZ041-GW-111113
		35 - 45	35 - 45	25.4 - 35.4	25.4 - 35.4	28.7 - 38.7	28.7 - 38.7	26.6 - 36.6	26.6 - 36.6	26.6 - 36.6
		2/20/2013	11/11/2013	2/20/2013	11/11/2013	2/20/2013	11/11/2013	2/20/2013	2/20/2013	11/11/2013
1,2-Dichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	--	1 U	1 U	1 U	<b>1</b>	1 U	<b>1.08</b>	1 U	1 U	1 U
1,3-Dichlorobenzene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	--	1 U	3.95 B	1 U	<b>1.72</b>	1 U	<b>2.1</b>	1 U	1 U	4.82 B
1,4-Dioxane (p-Dioxane)	--	100 UL	1.06 U	100 UL	<b>8.62</b>	100 UL	1.12 U	100 UL	100 UL	1.11 U
2-Butanone	--	5 U	5 UJ	5 U	5 UJ	5 U	5 U	5 U	5 U	5 UJ
2-Hexanone	--	5 U	5 UJ	5 U	5 UJ	5 U	5 U	5 U	5 U	5 UJ
4-Methyl-2-pentanone	--	5 UL	5 U	5 UL	5 U	5 UL	5 U	5 UL	5 UL	5 U
Acetone	--	5 UL	5 UL	5 UL	5 UL	5 UL	5 U	5 UL	5 UL	5 UL
Acrylonitrile	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Benzene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon tetrachloride	--	<b>5.58</b>	<b>3.13</b>	1 U	1 U	<b>4.91</b>	<b>4.78</b>	<b>66.5</b>	<b>66.7</b>	<b>66.7</b>
Chlorobenzene	--	1 U	3.02 B	1 U	1 U	1 U	1 U	1 U	1 U	3.86 B
Chloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	--	<b>1.6</b>	<b>1.76</b>	1 U	1 U	1 U	1 U	<b>6.31</b>	<b>5.98</b>	<b>6.94</b>
Chloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethylene	--	1 U	1 U	<b>13.2</b>	<b>5.92</b>	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
tert-Butyl Methyl Ether	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	--	1 U	1 U	<b>4.28</b>	<b>2.4</b>	1 U	1 U	1 U	1 U	1 U
Toluene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trans-1,2-Dichloroethylene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethylene	--	1 U	1 U	<b>2.42</b>	<b>1.13</b>	1 U	1 U	1 U	1 U	<b>1.03</b>
Vinyl acetate	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Vinyl chloride	--	1 U	1 U	<b>2.53</b>	1 U	1 U	1 U	1 U	1 U	1 U
VOCs, Total	--	<b>7.18</b>	<b>14.75</b>	<b>22.43</b>	<b>22.14</b>	<b>4.91</b>	<b>9.43</b>	<b>72.81</b>	<b>72.68</b>	<b>86.9</b>
Xylenes, Total	--	5 U	1 U	5 U	1 U	5 U	1 U	5 U	5 U	1 U

**Notes:**

NA = Not analyzed

B = The analyte was detected in the associated method and/or calibration blank.

R = The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet the quality control criteria. The presence or absence of the analyte cannot be verified.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

UL = The analyte was analyzed for but was not detected. The quantitation limit may be biased low.

ug/L = Micrograms per liter

**Bold indicates the analyte was detected**

Pore water screening level not applicable, as Building 82 Area is not adjacent to the Kanawha.



TABLE 3-2

## Summary of Chemicals Detected in Groundwater: Site SCF Middle Mainland Remediation Area

Analyte	Location	MW027		MW037		MW038	PZ030	PZ031		PZ032	
	Sample ID	MW027-GW-022513	MW027-GW-110913	MW037-GW-022213	MW037-GW-111113	MW038-GW-022213	PZ030-GW-022213	PZ031-GW-022513	PZ031-GW-112013	PZ032-GW-022313	PZ032-GW-112013
	Sample Depth (ft)	49 - 59	49 - 59	29 - 39	29 - 39	31 - 41	17 - 27	27.4 - 37.4	27.4 - 37.4	32 - 42	32 - 42
Screening Level		2/25/2013	11/9/2013	2/22/2013	11/11/2013	2/22/2013	2/22/2013	2/25/2013	11/20/2013	2/23/2013	11/20/2013
SVOCs (ug/L)											
2,4,5-Trichlorophenol	--	--	5.32 U	--	5.56 U	--	--	52.1 U	--	5.43 U	
2,4,6-Trichlorophenol	--	--	5.32 U	--	5.56 U	--	--	52.1 U	--	5.43 U	
2,4-Dichlorophenol	--	--	5.32 U	--	5.56 U	--	--	52.1 U	--	5.43 U	
2,4-Dimethylphenol	--	--	5.32 U	--	5.56 U	--	--	52.1 U	--	5.43 U	
2,4-Dinitrophenol	--	--	26.6 UJ	--	27.8 U	--	--	260 UJ	--	27.2 UJ	
2,4-Dinitrotoluene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
2,6-Dinitrotoluene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
2-Choronaphthalene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
2-Chlorophenol	--	--	5.32 U	--	5.56 U	--	--	52.1 U	--	5.43 U	
2-Methylnaphthalene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
2-Methylphenol	--	--	5.32 U	--	5.56 U	--	--	52.1 U	--	5.43 U	
2-Nitroaniline	--	--	26.6 U	--	27.8 U	--	--	260 UL	--	27.2 U	
2-Nitrophenol	--	--	5.32 U	--	5.56 U	--	--	52.1 U	--	5.43 U	
3,3'-Dichlorobenzidine	--	--	5.32 U	--	R	--	--	52.1 UL	--	5.43 U	
3-Methylphenol & 4-Methylphenol	--	--	10.6 U	--	11.1 U	--	--	104 U	--	10.9 U	
3-Nitroaniline	--	--	26.6 U	--	27.8 U	--	--	260 UL	--	27.2 U	
4,6-Dinitro-2-methylphenol	--	--	26.6 UJ	--	27.8 U	--	--	260 U	--	27.2 U	
4-Bromophenyl phenyl ether	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
4-Chloro-3-methylphenol	--	--	5.32 U	--	5.56 U	--	--	52.1 U	--	5.43 U	
4-Chloroaniline	--	--	21.3 U	--	22.2 U	--	--	208 UL	--	21.7 U	
4-Chlorophenyl phenyl ether	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
4-Nitroaniline	--	--	26.6 U	--	27.8 U	--	--	260 UL	--	27.2 U	
4-Nitrophenol	--	--	26.6 U	--	27.8 U	--	--	260 U	--	27.2 U	
Acenaphthene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Acenaphthylene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Anthracene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Benzo (a) anthracene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Benzo (a) pyrene	--	--	5.32 U	--	27.8 U	--	--	52.1 UL	--	5.43 U	
Benzo (b) fluoranthene	--	--	5.32 U	--	27.8 U	--	--	52.1 UL	--	5.43 U	
Benzo (g,h,i) perylene	--	--	5.32 U	--	27.8 U	--	--	52.1 UL	--	5.43 U	
Benzo(k)fluoranthene	--	--	5.32 U	--	27.8 U	--	--	52.1 UL	--	5.43 U	
Bis (2-chloroethoxy) methane	--	--	5.32 U	--	<b>14.3</b>	--	--	52.1 UL	--	5.43 U	
Bis (2-chloroethyl) ether	--	--	5.32 U	--	<b>7.46</b>	--	--	<b>317 L</b>	--	5.43 U	
Bis (2-chloroisopropyl) ether	--	--	5.32 U	--	<b>239</b>	--	--	52.1 UL	--	5.43 U	
Bis (2-ethylhexyl) phthalate	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Butyl benzylphthalate	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Carbazole	--	--	21.3 U	--	22.2 U	--	--	208 UL	--	21.7 U	
Chrysene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Di-n-butylphthalate	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Di-n-octylphthalate	--	--	5.32 U	--	27.8 U	--	--	52.1 UL	--	5.43 U	
Dibenzo (a,h) anthracene	--	--	5.32 U	--	27.8 U	--	--	52.1 UL	--	5.43 U	
Dibenzofuran	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Diethyl phthalate	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Dimethyl phthalate	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Fluoranthene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Fluorene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Hexachlorobenzene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Hexachlorobutadiene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Hexachlorocyclopentadiene	--	--	5.32 UL	--	5.56 UL	--	--	52.1 UL	--	5.43 UL	
Hexachloroethane	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Indeno (1,2,3-c,d) pyrene	--	--	5.32 U	--	27.8 U	--	--	52.1 UL	--	5.43 U	
Ispophorone	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
n-Nitrosodi-n-propylamine	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
n-Nitrosodiphenylamine	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Naphthalene	193	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	<b>20.4</b>	<b>3.06</b>
Nitrobenzene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Pentachlorophenol	--	--	26.6 U	--	27.8 U	--	--	260 UJ	--	27.2 UJ	
Phenanthrene	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	
Phenol	--	--	5.32 U	--	5.56 U	--	--	52.1 UL	--	5.43 U	



TABLE 3-2

## Summary of Chemicals Detected in Groundwater: Site SCF Middle Mainland Remediation Area

Analyte	Location	MW027		MW037		MW038	PZ030	PZ031		PZ032	
	Sample ID	MW027-GW-022513	MW027-GW-110913	MW037-GW-022213	MW037-GW-111113	MW038-GW-022213	PZ030-GW-022213	PZ031-GW-022513	PZ031-GW-112013	PZ032-GW-022313	PZ032-GW-112013
	Sample Depth (ft)	49 - 59	49 - 59	29 - 39	29 - 39	31 - 41	17 - 27	27.4 - 37.4	27.4 - 37.4	32 - 42	32 - 42
	Sample Date	2/25/2013	11/9/2013	2/22/2013	11/11/2013	2/22/2013	2/22/2013	2/25/2013	11/20/2013	2/23/2013	11/20/2013
Screening Level		--	--	--	--	--	--	--	--	--	--
	Pyrene	--	--	5.32 U	--	5.56 U	--	--	--	52.1 UL	--
VOCs (ug/L)											
1,1,1-Trichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
1,1,2,2-Tetrachloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
1,1,2-Trichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	228	181	1 U	1 U
1,1-Dichloroethane	47	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
1,1-Dichloroethene	25	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
1,2,4-Trichlorobenzene	110	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
1,2-Dichlorobenzene	14	1 U	1.2 B	1 U	1.85	1 U	1 U	25 U	50 U	1 U	1 U
1,2-Dichloroethane	100	1 U	1 U	4.35	1.87	1 U	1 U	8770	6570	1 U	1 U
1,2-Dichloropropane	8300	1 U	2.43	1 U	1 U	1 U	1 U	779	590	1 U	2.1
1,3-Dichlorobenzene	71	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
1,4-Dichlorobenzene	15	1 U	1.78 B	1 U	2.62	1 U	1 U	25 U	50 U	1 U	1 U
1,4-Dioxane (p-Dioxane)	22740	R	1.09 UJ	1790 L	534 L	100 U	100	2500 U	202 L	R	9.18
2-Butanone	--	5 U	5 U	5 U	5 U	5 U	5 U	125 U	250 U	5 U	5 U
2-Hexanone	--	5 U	5 U	5 U	5 U	5 U	5 U	125 U	250 U	5 U	5 U
4-Methyl-2-pentanone	--	5 U	5 U	5 U	5 U	5 UL	5 UL	125 UL	250 U	5 U	5 U
Acetone	--	5 U	5 U	5 U	5 U	5 UL	5 UL	125 UL	250 UL	5 U	5 UL
Acrylonitrile	--	5 U	5 U	5 U	5 U	5 U	5 U	125 U	250 U	5 U	5 U
Benzene	130	2.77	1 U	51.7	25.5	1 U	1 U	3890	2670	10.7	120
Bromodichloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Bromoform	140	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Bromomethane	--	1 U	1 U	1 U	1 U	1 U	1 U	25 UJ	50 UJ	1 U	1 UJ
Carbon disulfide	--	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Carbon tetrachloride	--	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Chlorobenzene	64	1 U	1 U	1 U	1.12	2.88	1 U	201	92.2	1 U	1 U
Chloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Chloroform	--	1 U	1 U	1 U	1 U	1 U	1 U	276	170	1 U	1 U
Chloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	25 UJ	50 U	1 U	1 U
cis-1,2-Dichloroethylene	590	1 U	1 U	75.7	33	2.16	1.3	1440	864	21.5	205
cis-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Dibromochloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Ethylbenzene	7	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	241	4.3
Methylene chloride	--	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Styrene	72	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1.18
tert-Butyl Methyl Ether	--	13.9	16.4	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Tetrachloroethene	98	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Toluene	10	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	15	16
Trans-1,2-Dichloroethylene	970	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1.3
trans-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	1 U	1 U
Trichloroethylene	47	1 U	1 U	6.98	3.79	1.15	1.79	436	163	1.77	115
Vinyl acetate	--	5 U	5 UJ	5 U	5 U	5 U	5 U	125 U	250 U	5 U	5 U
Vinyl chloride	930	1 U	1 U	171 J	59.5	1 U	1.09	150 J	114	10 J	56.9
VOCs, Total	--	16.67	21.81	3409.73	663.25	6.19	104.18	16170	11616.2	365.07	532.49
Xylenes, Total	67	1 U	1 U	1 U	1 U	1 U	1 U	25 U	50 U	65.1	1.53

**Notes:**

NA = Not analyzed

B = The analyte was detected in the associated method and/or calibration blank.

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

L = The analyte was positively identified, but the associated numerical value may be biased low.

R = The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet the quality control criteria. The presence or absence of the analyte cannot be verified.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

UL = The analyte was analyzed for but was not detected. The quantitation limit may be biased low.

ug/L = Micrograms per liter

**Bold indicates the analyte was detected**

Shading indicates the result exceeded screening criteria



TABLE 3-3

Summary of Chemicals Detected in Groundwater: Site SCF Chlorhydrin Remediation Area

Analyte	Location Sample ID	MW029	MW035	MW040	MW048		MW049	MW060		MW062	MW067		MW072				
		MW029-GW-022113	MW029-GW-111313	MW035-GW-022113	MW040-GW-022113	MW040-GW-110913	MW048-GW-110813	MW048-GW-110813D	MW049-GW-022113	MW060-GW-022113	MW060-GW-110813	MW062-GW-022113	MW067-GW-022113	MW067-GW-110813	MW072-GW-022113	MW072-GW-110813	
		Sample Depth (ft)	28 - 38	28 - 38	39 - 49	31 - 41	31 - 41	36 - 46	36 - 46	51 - 61	46 - 56	46 - 56	52 - 62	48 - 58	48 - 58	40 - 50	40 - 50
SVOCs (ug/L)	Screening Level	2/21/2013	11/13/2013	2/21/2013	2/20/2013	11/9/2013	11/8/2013	11/8/2013	2/21/2013	2/21/2013	11/8/2013	2/20/2013	2/21/2013	11/8/2013	2/21/2013	11/8/2013	
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 UL	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	11.1 U	--	--	10.4 U	11.2 U	11.1 U	--	--	11.6 U	--	--	11.1 U	--	11.5 U
		--	--	27.8 UL	--	--	26 U	28.1 U	27.8 U	--	--	29.1 U	--	--	27.8 U	--	28.7 U
		--	--	27.8 U	--	--	26 UJ	28.1 UJ	27.8 UJ	--	--	29.1 UJ	--	--	27.8 UJ	--	28.7 UJ
		--	--	27.8 U	--	--	26 U	28.1 U	27.8 U	--	--	29.1 U	--	--	27.8 U	--	28.7 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
Acenaphthene	Screening Level	--	--	22.2 UL	--	--	20.8 U	22.5 U	22.2 U	--	--	23.3 U	--	--	22.2 U	--	23 U
		--	--	27.8 UL	--	--	26 U	28.1 U	27.8 U	--	--	29.1 U	--	--	27.8 U	--	28.7 U
		--	--	27.8 U	--	--	26 U	28.1 U	27.8 U	--	--	29.1 U	--	--	27.8 U	--	28.7 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
VOCs (ug/L)	Screening Level	193	5 U	1 U	1 U	50 U	5.21 U	5.62 U	5.56 U	1 U	20 U	5.81 U	5 U	10 U	5.56 U	5 U	5 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 UL	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U	--	--	5.56 U	--	5.75 U
		--	--	5.56 U	--	--	5.21 U	5.62 U	5.56 U	--	--	5.81 U					



TABLE 3-3

Summary of Chemicals Detected in Groundwater: Site SCF Chlorhydrin Remediation Area

Analyte	MW073	MW073-GW-022013	MW073-GW-110913	MW074	MW074-GW-022113	MW074-GW-110813	MW075	MW075-GW-022113	MW076	MW076-GW-022113	MW077	MW077-GW-022113	MW077-GW-110813	MW078	MW078-GW-022113	MW078-GW-110913	MW093	MW093-GW-022013	MW094	MW094-GW-022013	MW094-GW-110813	PZ034
	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	999 - 999	999 - 999	999 - 999	32.8 - 42.8			
	2/20/2013	11/9/2013	2/21/2013	11/8/2013	2/21/2013	2/21/2013	2/21/2013	11/8/2013	2/21/2013	11/9/2013	2/21/2013	11/8/2013	2/20/2013	2/20/2013	2/20/2013	2/20/2013	11/8/2013	11/8/2013				
<b>SVOCs (ug/L)</b>																						
2,4,5-Trichlorophenol	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
2,4,6-Trichlorophenol	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
2,4-Dichlorophenol	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
2,4-Dimethylphenol	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
2,4-Dinitrophenol	--	27.2 UJ	--	27.5 UJ	--	--	--	27.5 UJ	--	26.3 UJ	--	--	--	--	27.2 UJ	27.8 UJ						
2,4-Dinitrotoluene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
2-Chloronaphthalene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
2-Chlorophenol	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
2-Methylphthalene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
2-Methylphenol	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
2-Nitroaniline	--	27.2 U	--	27.5 U	--	--	--	27.5 U	--	26.3 U	--	--	--	--	27.2 U	27.8 U						
2-Nitrophenol	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
3,3'-Dichlorobenzidine	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
3-Methyphenol & 4-Methylphenol	--	10.9 U	--	11 U	--	--	--	11 U	--	10.5 U	--	--	--	--	10.9 U	11.1 U						
3-Nitroaniline	--	27.2 U	--	27.5 U	--	--	--	27.5 U	--	26.3 U	--	--	--	--	27.2 U	27.8 U						
4,6-Dinitro-2-methylphenol	--	27.2 UJ	--	27.5 UJ	--	--	--	27.5 UJ	--	26.3 UJ	--	--	--	--	27.2 UJ	27.8 UJ						
4-Bromophenyl phenyl ether	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
4-Chloro-3-methylphenol	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
4-Chloroaniline	--	21.7 U	--	22 U	--	--	--	22 U	--	21.1 U	--	--	--	--	21.7 U	22.2 U						
4-Chlorophenyl phenyl ether	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
4-Nitroaniline	--	27.2 U	--	27.5 U	--	--	--	27.5 U	--	26.3 U	--	--	--	--	27.2 U	27.8 U						
4-Nitrophenol	--	27.2 U	--	27.5 U	--	--	--	27.5 U	--	26.3 U	--	--	--	--	27.2 U	27.8 U						
Acenaphthene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Acenaphthylene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Anthracene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Benzo (a) anthracene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Benzo (a) pyrene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Benzo (b) fluoranthene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Benzo (g,h,i) perylene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Benzol(k)fluoranthene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Bis (2-chloroethoxy) methane	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Bis (2-chloroethyl) ether	--	1060	--	50.6	--	--	--	562	--	2590	--	--	--	--	237 K	5.56 U						
Bis (2-chloroisopropyl) ether	--	11400	--	1280	--	--	--	693	--	736	--	--	--	--	20.7	47.9						
Bis (2-ethylhexyl) phthalate	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Butyl benzylphthalate	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Carbazole	--	21.7 U	--	22 U	--	--	--	22 U	--	21.1 U	--	--	--	--	21.7 U	22.2 U						
Chrysene	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Di-n-butylphthalate	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Di-n-octylphthalate	--	5.43 U	--	5.49 U	--	--	--	5.49 U	--	5.26 U	--	--	--	--	5.43 U	5.56 U						
Dibenzo (a,h) anthracene	--	5.43 U	--	5.49 U																		



TABLE 3-3

Summary of Chemicals Detected in Groundwater: Site SCF Chlorhydrin Remediation Area

Analyte	Location Sample ID	MW029		MW035		MW040		MW048		MW049		MW060		MW062		MW067		MW072	
		MW029-GW-022113	MW029-GW-111313	MW035-GW-022113	MW040-GW-022013	MW040-GW-110913	MW048-GW-110813	MW048-GW-110813D	MW049-GW-022113	MW060-GW-022113	MW060-GW-110813	MW062-GW-022013	MW067-GW-022113	MW067-GW-110813	MW072-GW-022113	MW072-GW-110813			
		Sample Depth (ft)	28 - 38	28 - 38	39 - 49	31 - 41	31 - 41	36 - 46	36 - 46	51 - 61	46 - 56	46 - 56	52 - 62	48 - 58	48 - 58	40 - 50	40 - 50		
		Sample Date	2/21/2013	11/13/2013	2/21/2013	2/20/2013	11/9/2013	11/8/2013	11/8/2013	2/21/2013	2/21/2013	11/8/2013	2/20/2013	2/21/2013	11/8/2013	2/21/2013	11/8/2013		
		Screening Level																	
Chloroform	--	<b>82.5</b>	<b>24.7</b>	<b>1.05</b>	<b>80</b>	<b>117</b>	<b>1080</b>	<b>1100</b>	<b>21.4</b>	<b>20 U</b>	<b>100 U</b>	<b>5 U</b>	<b>14.8</b>	<b>25 U</b>	<b>5 U</b>	<b>5 U</b>	<b>5 U</b>		
Chloromethane	--	5 U	1 U	1 UJ	50 UJ	50 U	50 U	50 U	1 U	20 U	100 U	5 U	10 U	25 U	5 U	5 U	5 U		
cis-1,2-Dichloroethylene	590	<b>23.5</b>	<b>7.18</b>	<b>45.5</b>	50 U	50 U	<b>4540</b>	<b>4610</b>	<b>65.1</b>	<b>81.4</b>	<b>406</b>	<b>9.72</b>	<b>1390</b>	<b>1180</b>	<b>752</b>	<b>530</b>			
cis-1,3-Dichloropropene	--	5 U	1 U	1 U	50 U	50 U	50 U	50 U	1 U	20 U	100 U	5 U	10 U	25 U	5 U	5 U	5 U		
Dibromochloromethane	--	5 U	1 U	1 U	50 U	50 U	50 U	50 U	1 U	20 U	100 U	5 U	10 U	25 U	5 U	5 U	5 U		
Ethylbenzene	7	5 U	1 U	1 U	50 U	50 U	50 U	50 U	1 U	20 U	100 U	5 U	10 U	25 U	5 U	5 U	5 U		
Methylene chloride	--	5 U	1 U	1 U	50 U	50 U	<b>102</b>	<b>105</b>	1 U	20 U	100 U	5 U	10 U	25 U	5 U	5 U	5 U		
Styrene	72	5 U	1 U	1 U	50 U	50 U	50 U	50 U	1 U	20 U	100 U	5 U	10 U	25 U	5 U	5 U	5 U		
tert-Butyl Methyl Ether	--	5 U	<b>1.66</b>	1 U	50 U	50 U	50 U	50 U	1 U	20 U	100 U	5 U	10 U	25 U	5 U	5 U	5 U		
Tetrachloroethylene	98	<b>26.3</b>	<b>17.9</b>	<b>1.94</b>	50 U	50 U	<b>95.9</b>	<b>99.1</b>	<b>84.4</b>	20 U	100 U	5 U	<b>21.3</b>	25 U	<b>10.8</b>	<b>6.98</b>			
Toluene	10	5 U	1 U	1 U	50 U	50 U	50 U	50 U	1 U	20 U	100 U	5 U	10 U	25 U	5 U	5 U	5 U		
Trans-1,2-Dichloroethylene	970	<b>44.5</b>	<b>9.74</b>	<b>3.92</b>	50 U	50 U	<b>753</b>	<b>795</b>	<b>18.9</b>	20 U	100 U	5 U	<b>134</b>	<b>74.6</b>	<b>18.3</b>	<b>6.17</b>			
trans-1,3-Dichloropropene	--	5 U	1 U	1 U	50 U	50 U	50 U	50 U	1 U	20 U	100 U	5 U	10 U	25 U	5 U	5 U	5 U		
Trichloroethylene	47	<b>356</b>	<b>116</b>	<b>12.5</b>	50 U	50 U	<b>886</b>	<b>889</b>	<b>123</b>	20 U	100 U	5 U	<b>494</b>	<b>121</b>	<b>131</b>	<b>77.6</b>			
Vinyl acetate	--	25 U	5 U	5 U	250 U	250 U	250 U	250 U	5 U	100 U	500 U	25 U	50 U	125 U	25 U	25 U			
Vinyl chloride	930	<b>6.63 J</b>	<b>2.27</b>	<b>29.5</b>	50 U	50 U	<b>30500</b>	<b>29600</b>	<b>165</b>	<b>388</b>	<b>1640</b>	5 U	<b>2190</b>	<b>2320</b>	<b>553</b>	<b>466</b>			
VOCs, Total	--	<b>2502.83</b>	<b>618.01</b>	<b>1689.72</b>	<b>7090</b>	<b>12557</b>	<b>105265.9</b>	<b>92870.1</b>	<b>1857.57</b>	<b>72782.3</b>	<b>237338</b>	<b>739.72</b>	<b>20780.4</b>	<b>14254.1</b>	<b>4150.59</b>	<b>1771.85</b>			
Xylenes, Total	67	5 U	1 U	5 U	250 U	50 U	50 U	50 U	1 U	20 U	100 U	5 U	10 U	25 U	5 U	5 U			



TABLE 3-3

Summary of Chemicals Detected in Groundwater: Site SCF Chlorhydrin Remediation Area

Analyte	MW073		MW074		MW075		MW076		MW077		MW078		MW093		MW094		PZ034
	MW073-GW-022013	MW073-GW-110913	MW074-GW-022113	MW074-GW-110813	MW075-GW-022113	MW076-GW-022113	MW077-GW-022113	MW077-GW-110813	MW078-GW-022113	MW078-GW-110913	MW093-GW-022013	MW094-GW-022013	MW094-GW-110813	PZ034-GW-110813			
	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	40 - 50	999 - 999	999 - 999	999 - 999	32.8 - 42.8			
	2/20/2013	11/9/2013	2/21/2013	11/8/2013	2/21/2013	2/21/2013	2/21/2013	11/8/2013	2/21/2013	11/9/2013	2/20/2013	2/20/2013	11/8/2013	11/8/2013			
Chloroform	421	508	10 U	20 U	26.2	8.33	8.49	134	1000 U	323	47.3	49.7	37.9	2.37			
Chloromethane	250 UU	250 U	10 U	20 U	10 U	5 U	1UU	1 U	1000 U	250 U	10 U	5 U	5 U	1 U			
cis-1,2-Dichloroethylene	9020	12200	101	20 U	105	167	1 U	13.8	5660	4780	10 U	5 U	5 U	127			
cis-1,3-Dichloropropene	250 U	250 U	10 U	20 U	10 U	5 U	1 U	1 U	1000 U	250 U	10 U	5 U	5 U	1 U			
Dibromochloromethane	250 U	250 U	10 U	20 U	10 U	5 U	1 U	1 U	1000 U	250 U	10 U	5 U	5 U	1 U			
Ethylbenzene	250 U	250 U	10 U	20 U	10 U	5 U	1 U	1 U	1000 U	250 U	10 U	5 U	5 U	1 U			
Methylene chloride	250 U	250 U	10 U	20 U	10 U	5 U	1 U	6.18	1000 U	250 U	10 U	5 U	5 U	1 U			
Styrene	250 U	250 U	10 U	20 U	10 U	5 U	1 U	1 U	1000 U	250 U	10 U	5 U	5 U	1 U			
tert-Butyl Methyl Ether	250 U	250 U	10 U	20 U	10 U	5.62	3.04	1 U	1000 U	250 U	10 U	5 U	5 U	1 U			
Tetrachloroethylene	250 U	250 U	10 U	20 U	10 U	10.7	1 U	4.3	1000 U	250 U	10 U	5 U	5 U	1 U			
Toluene	250 U	250 U	10 U	20 U	10 U	5 U	1 U	1 U	1000 U	250 U	10 U	5 U	5 U	2.18			
Trans-1,2-Dichloroethylene	639	911	10 U	20 U	10 U	17.9	1.87	50.1	1730	1580	10 U	5 U	5 U	13.2			
trans-1,3-Dichloropropene	250 U	250 U	10 U	20 U	10 U	5 U	1 U	1 U	1000 U	250 U	10 U	5 U	5 U	1 U			
Trichloroethylene	971	1090	10 U	20 U	10 U	200	2.64	55.4	1000 U	250 U	10 U	5 U	5 U	141			
Vinyl acetate	1250 U	1250 U	50 U	100 U	50 U	25 U	5 U	5 U	5000 U	1250 U	50 U	25 U	25 U	5 U			
Vinyl chloride	7280	10700	1870	20 U	339	948	4.61	226	18600	15000	10 U	11.8	11.3	107			
VOCs, Total	65811	92335	11464.7	24948.2	9741.6	24408.65	115.61	3825.59	367940	217517	5532.6	2379	2274.4	4998.03			
Xylenes, Total	1250 U	250 U	10 U	20 U	10 U	5 U	5 U	1 U	1000 U	250 U	10 U	5 U	5 U	1 U			



## Figures



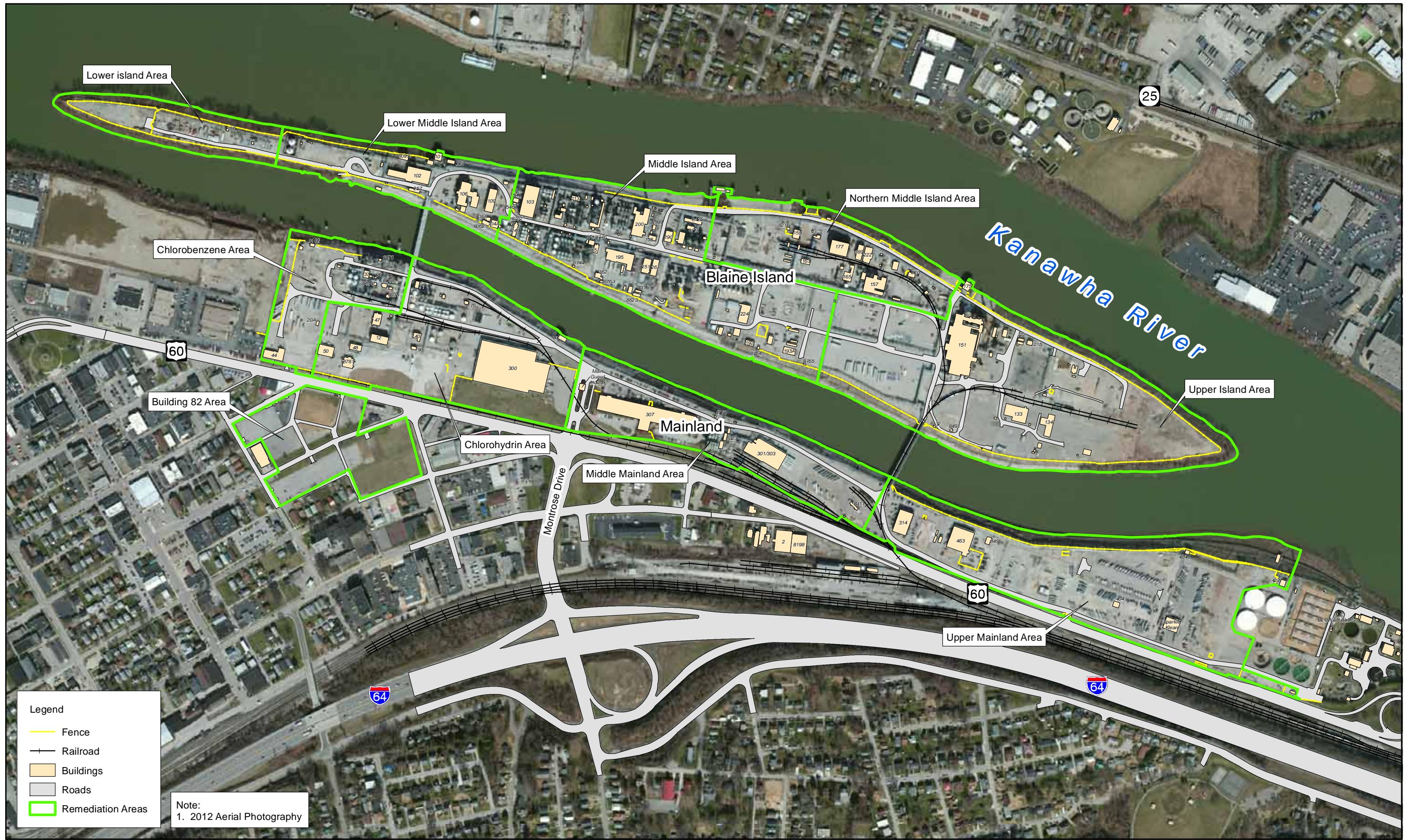
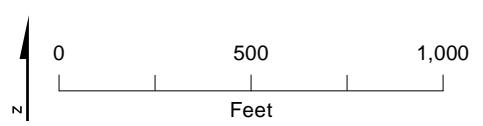
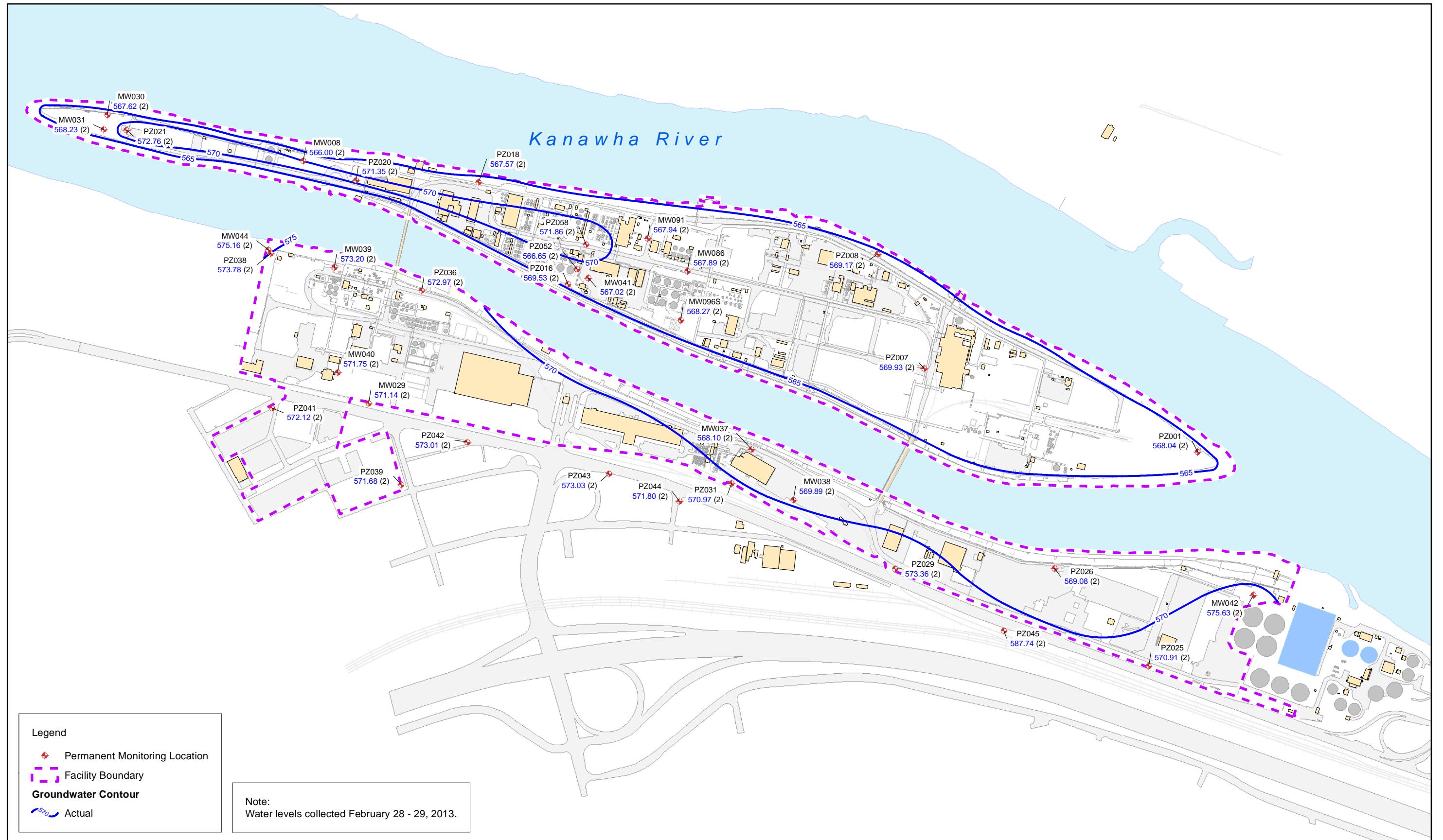


Figure 1-1  
Remediation Areas  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia

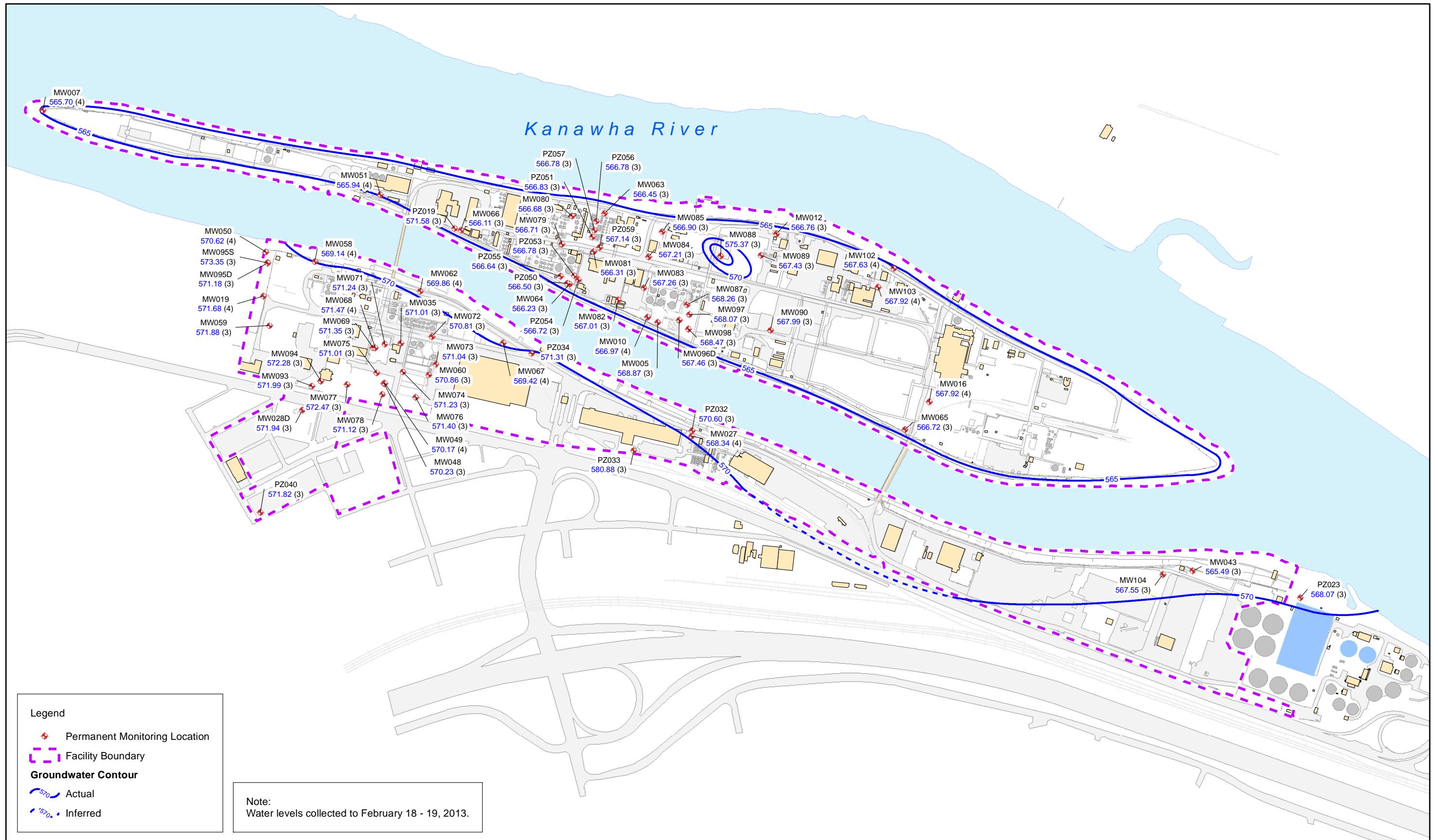






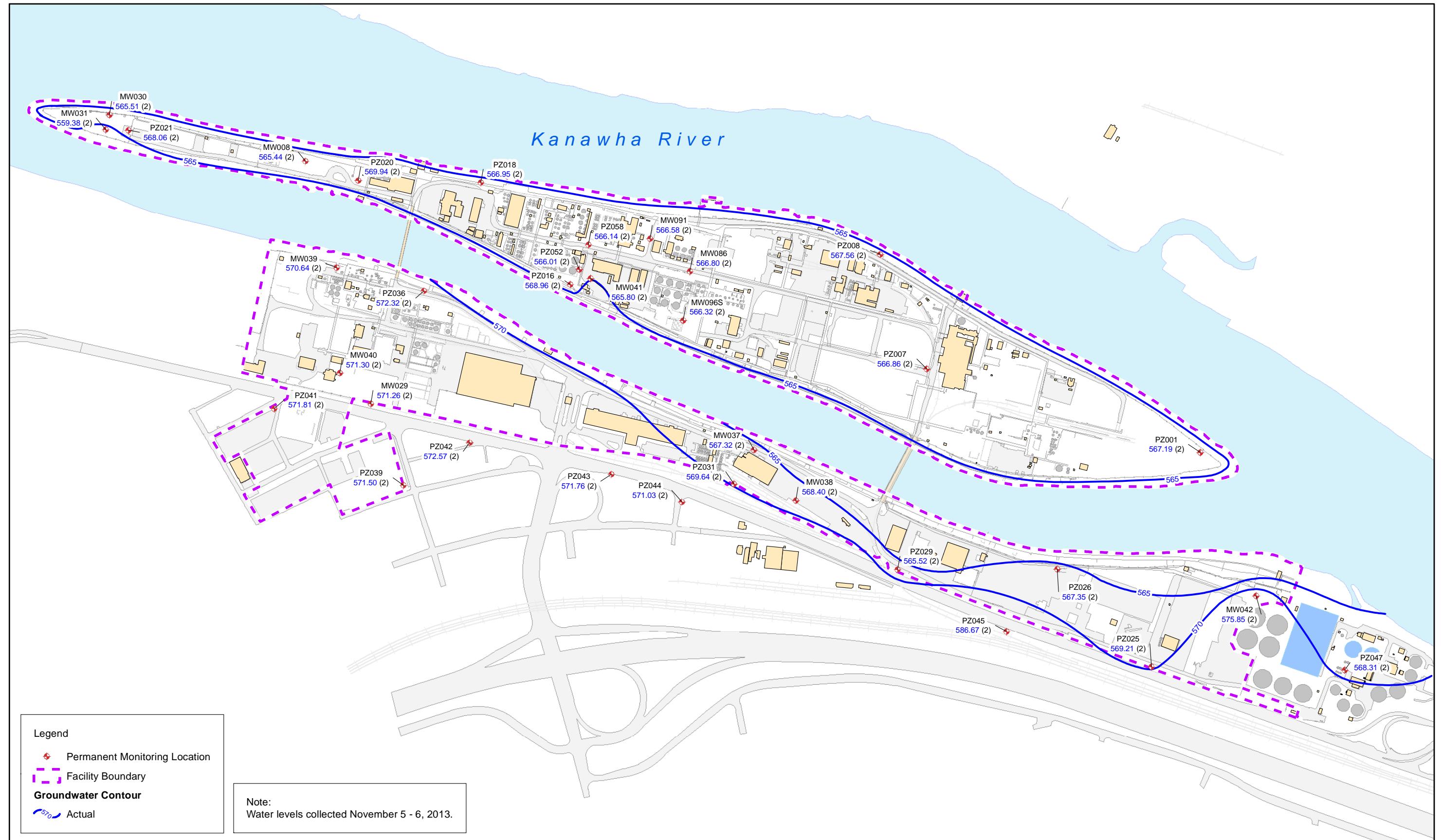
**Figure 3-1**  
Potentiometric Surface Shallow Alluvial Aquifer - February 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia



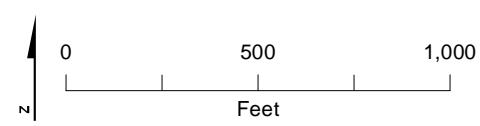


**Figure 3-2**  
Potentiometric Surface Intermediate and Deep Alluvial Aquifer - February 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia

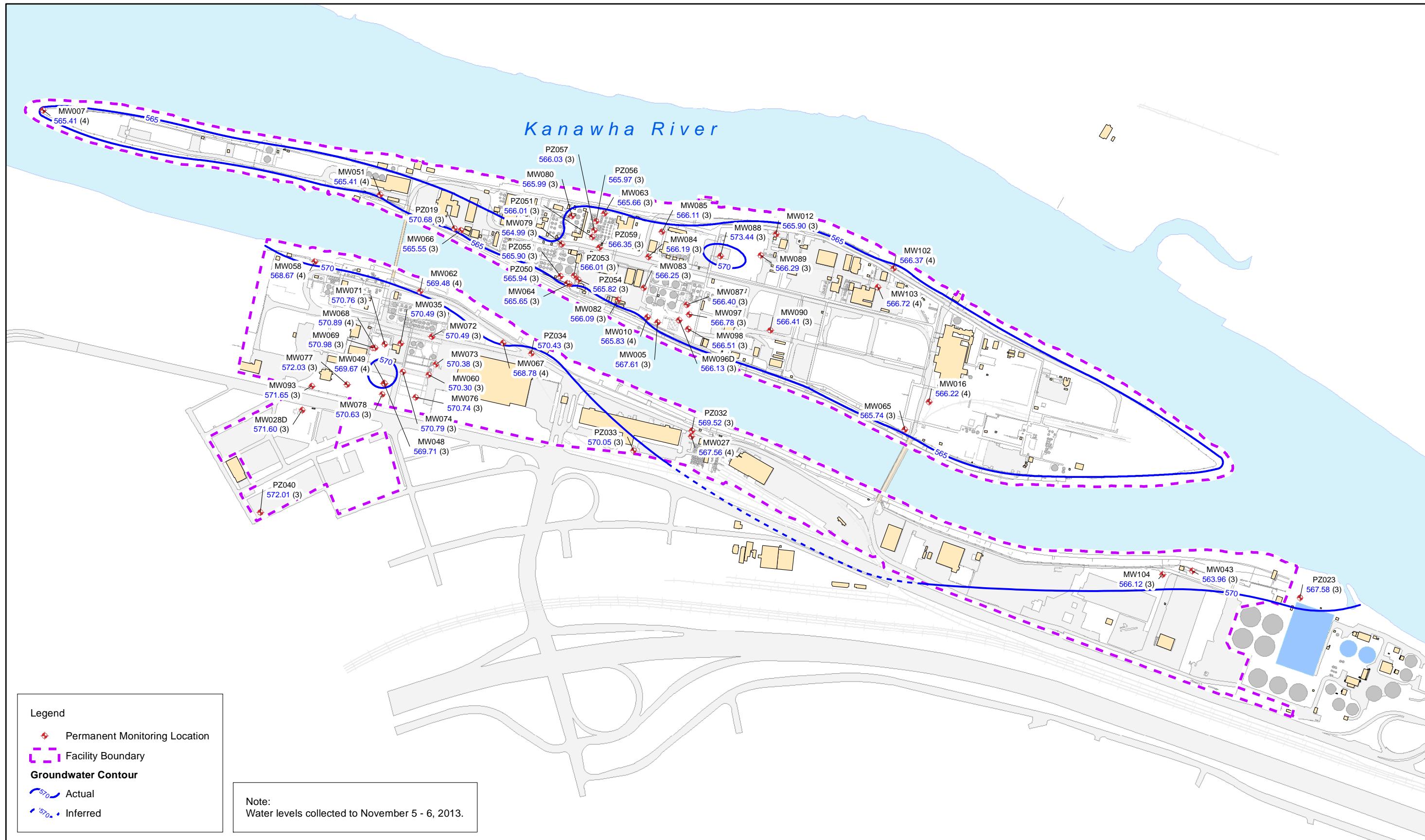




**Figure 3-3**  
Potentiometric Surface Shallow Alluvial Aquifer - November 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia







**Figure 3-4**  
Potentiometric Surface Intermediate and Deep Alluvial Aquifer - November 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia



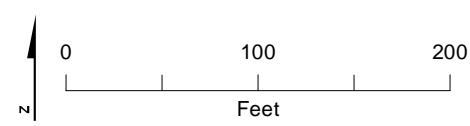
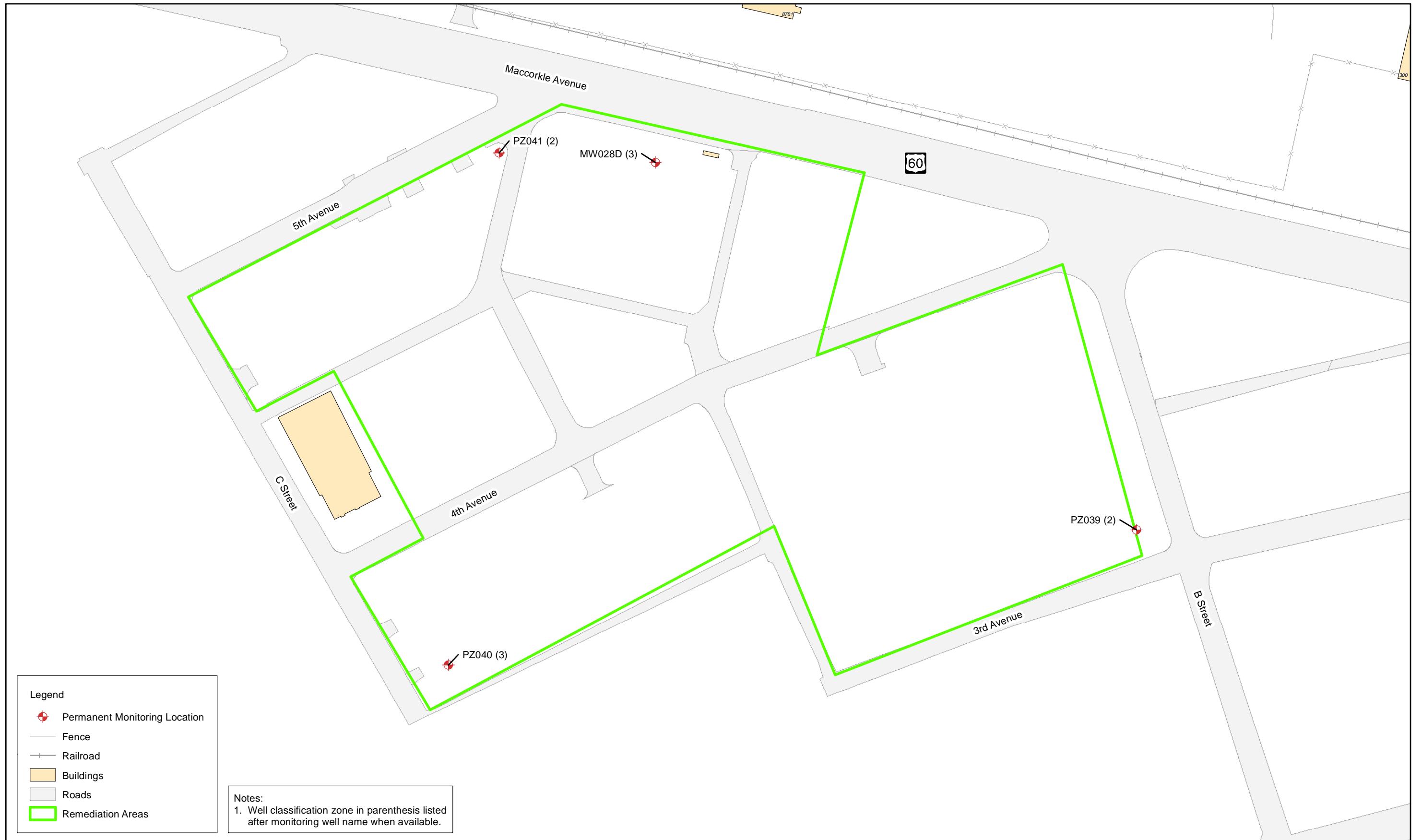


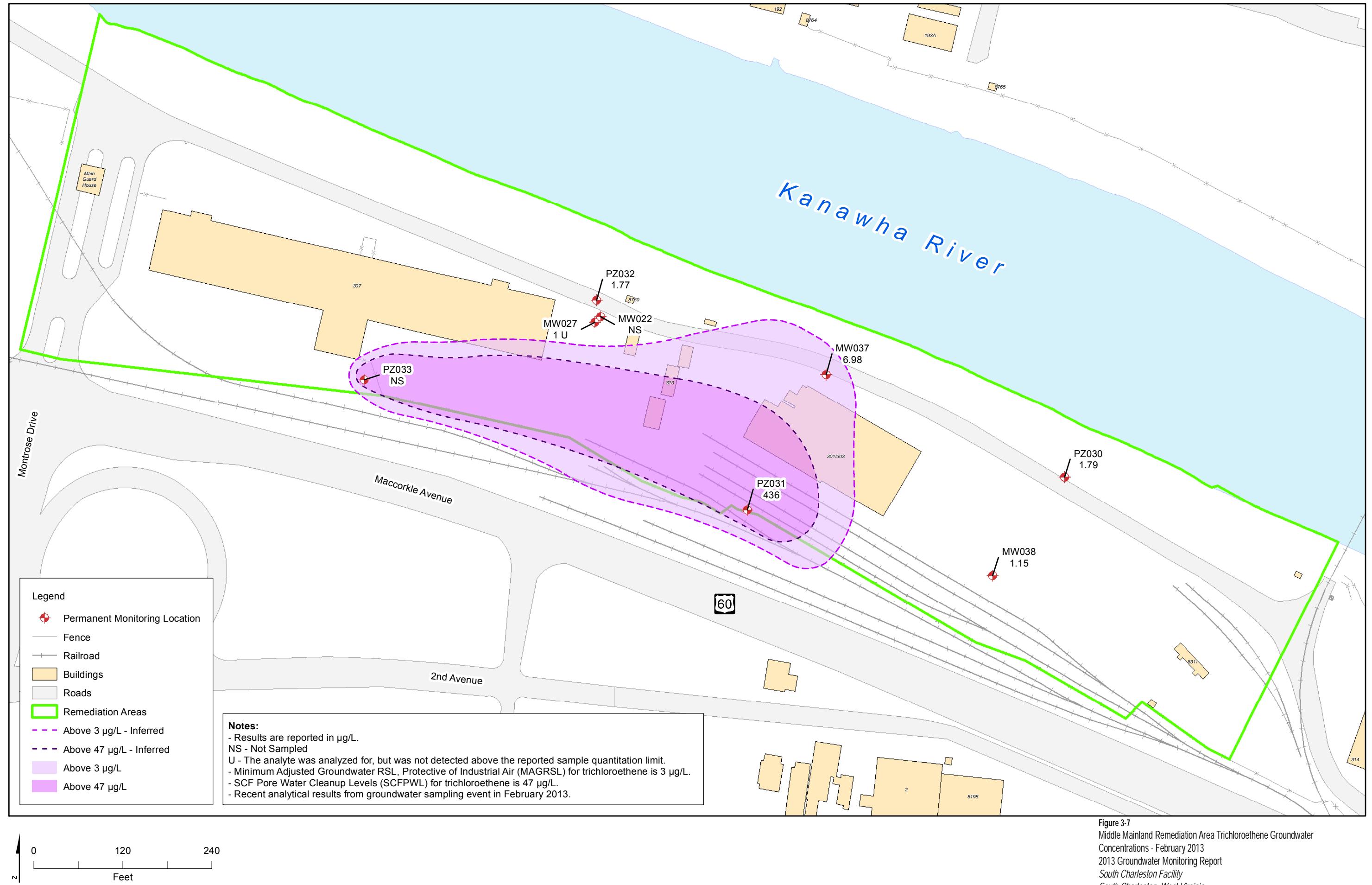
Figure 3-5  
Building 82 Remediation Area Monitoring Wells  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia





Figure 3-6  
Middle Mainland Remediation Area Monitoring Wells  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia







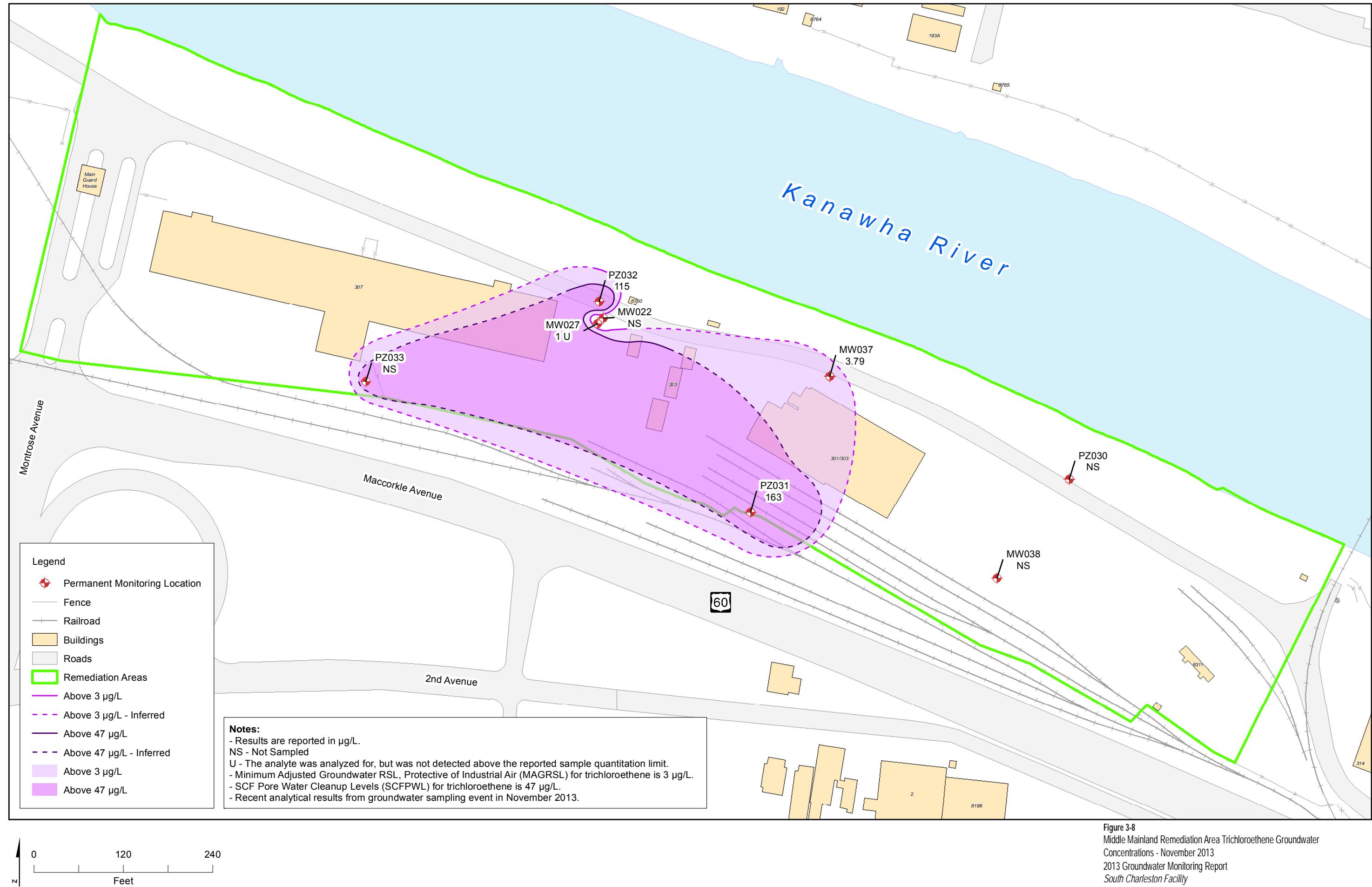
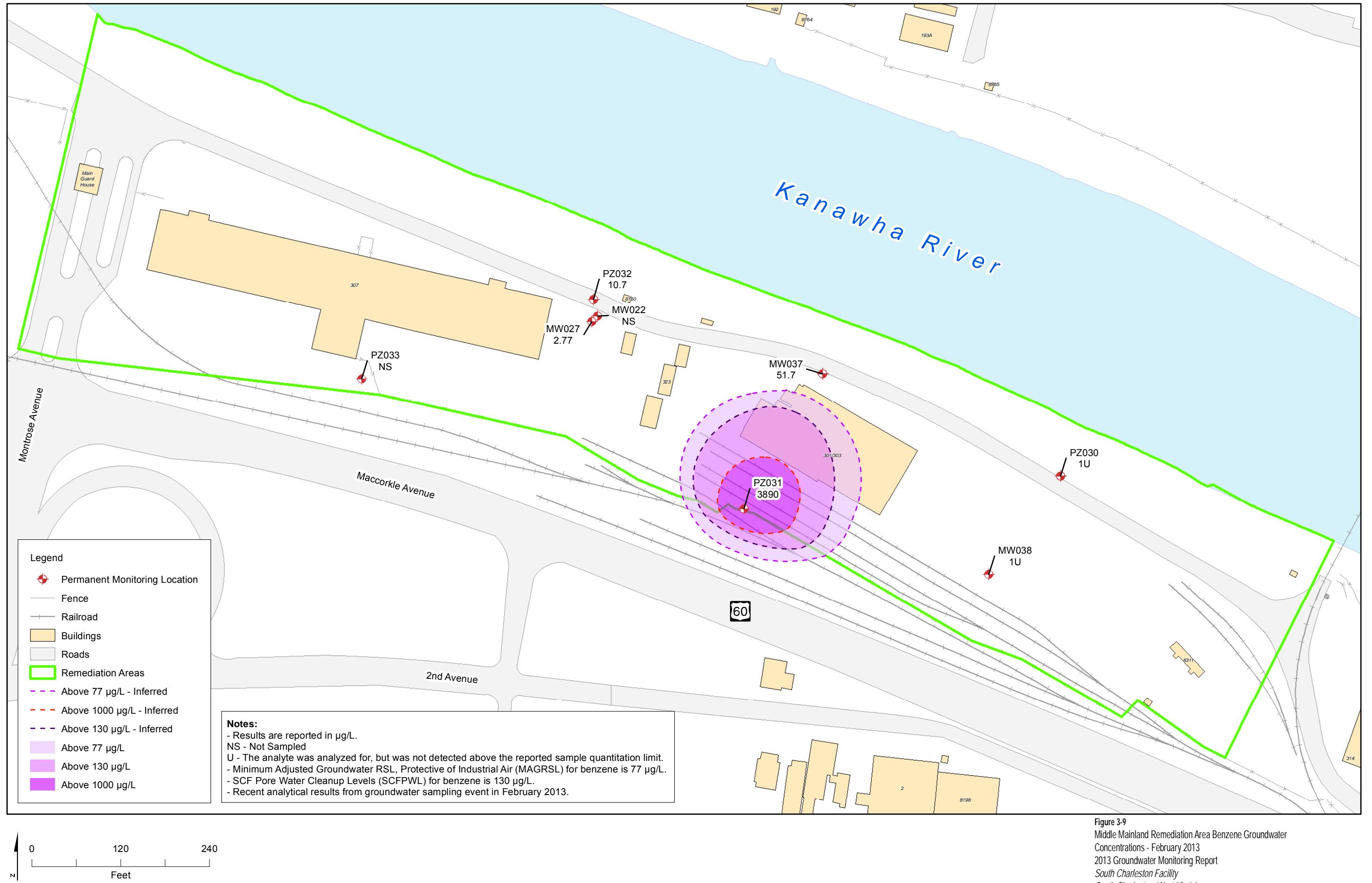


Figure 3-8  
Middle Mainland Remediation Area Trichloroethene Groundwater  
Concentrations - November 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia







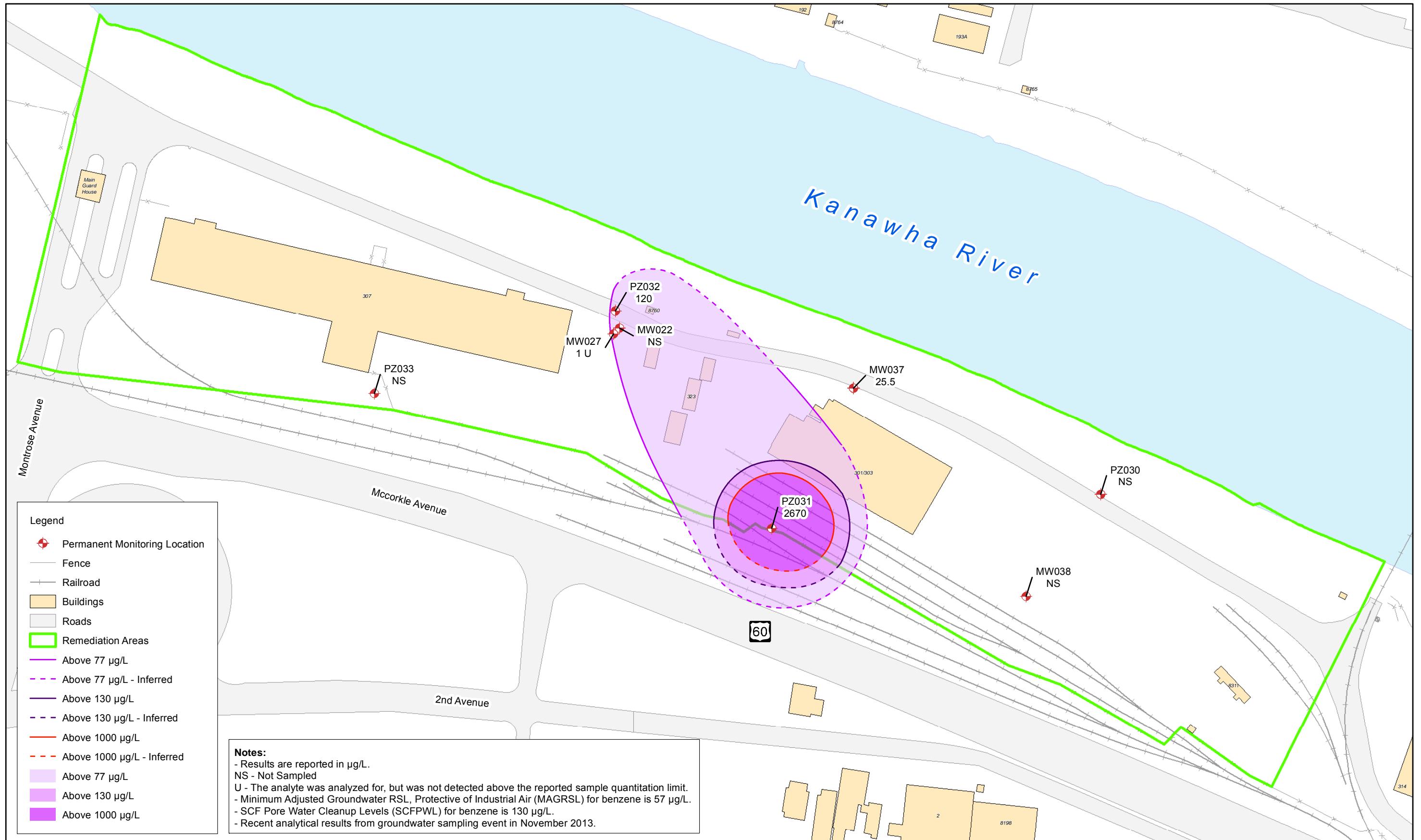
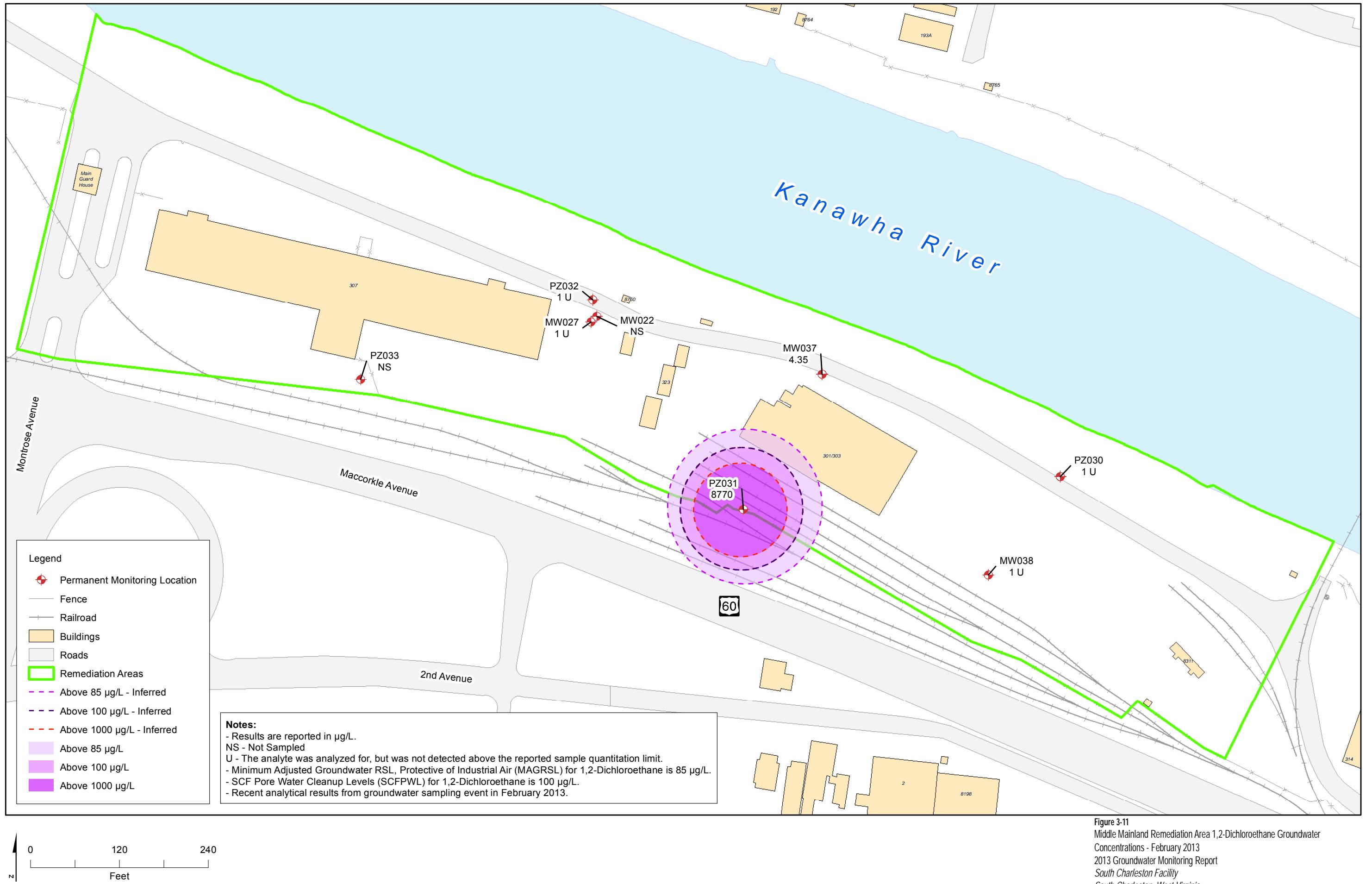


Figure 3-10  
Middle Mainland Remediation Area Benzene Groundwater  
Concentrations - November 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia







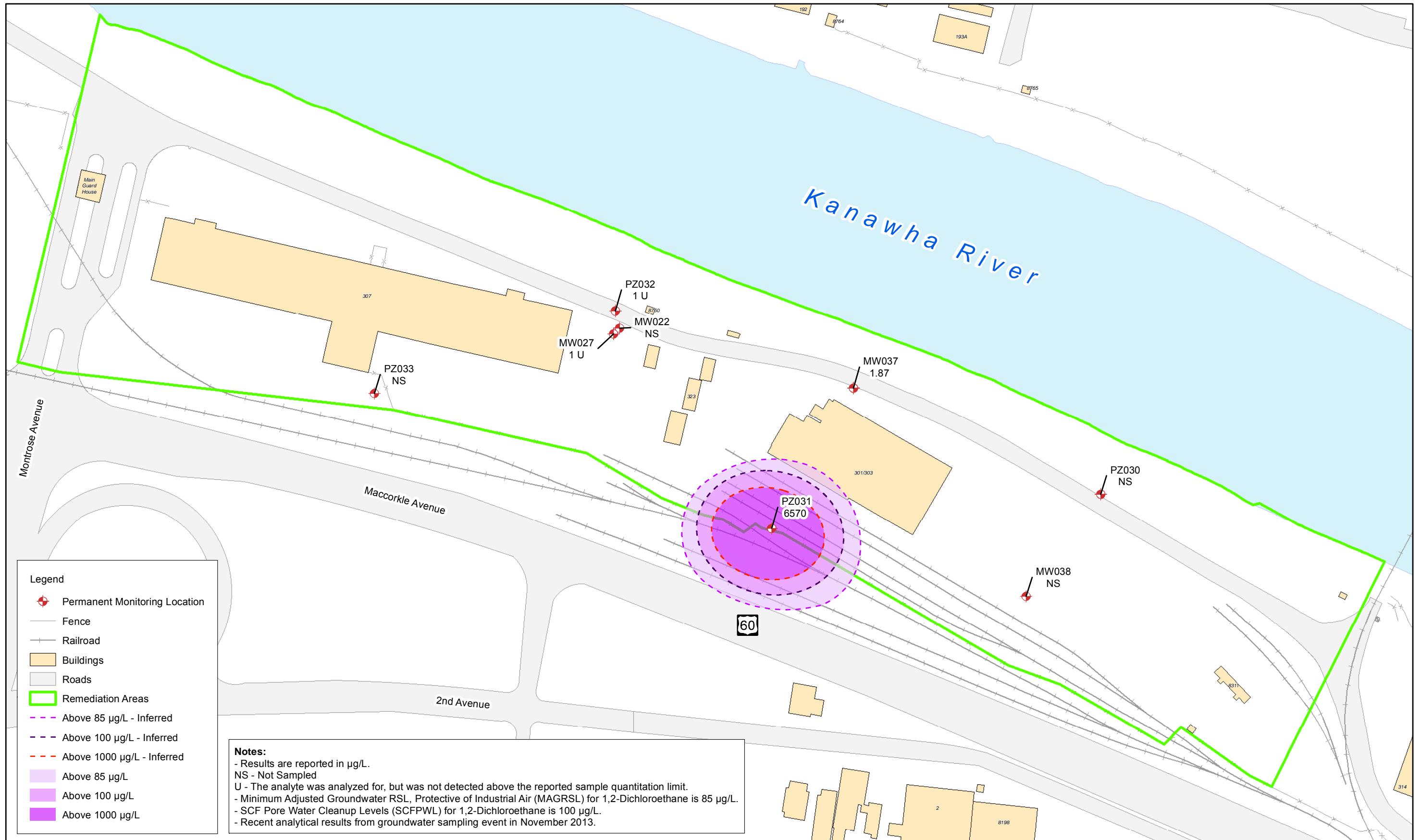


Figure 3-12  
Middle Mainland Remediation Area 1,2-Dichloroethane Groundwater  
Concentrations - February 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia



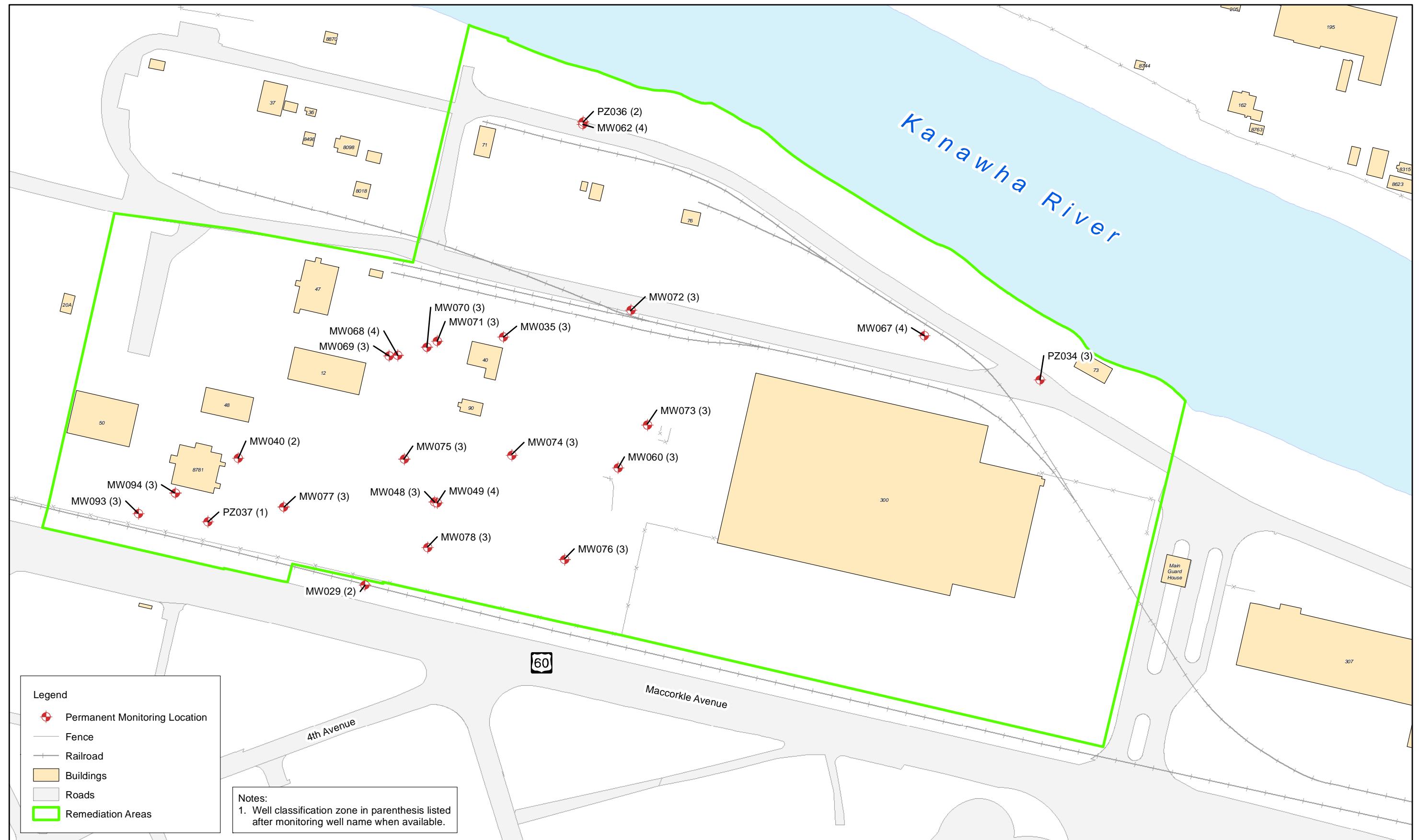


Figure 3-13  
Chlorhydrin Remediation Area Monitoring Wells  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia



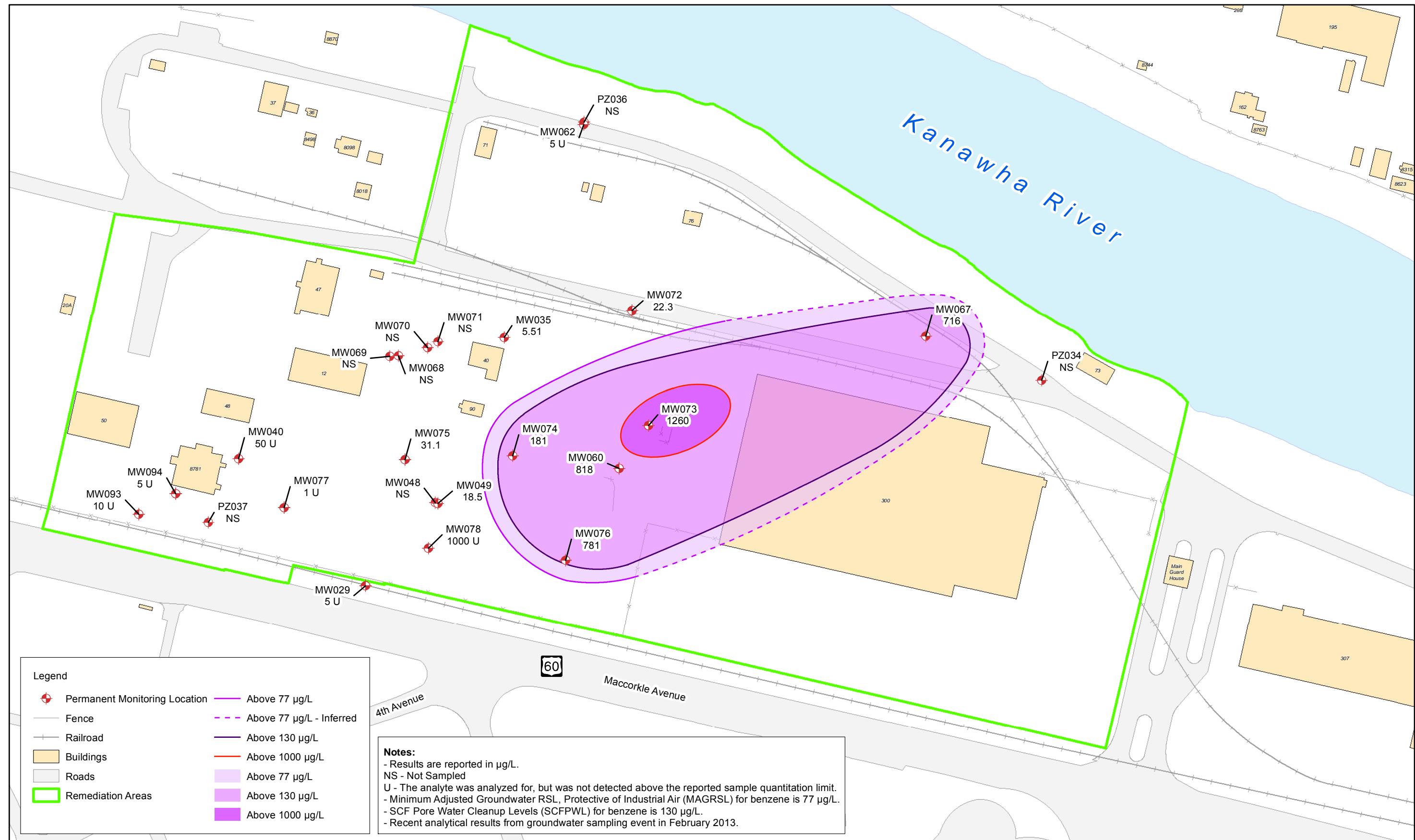


Figure 3-14  
Chlorhydrin Remediation Area Benzene Groundwater  
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2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia



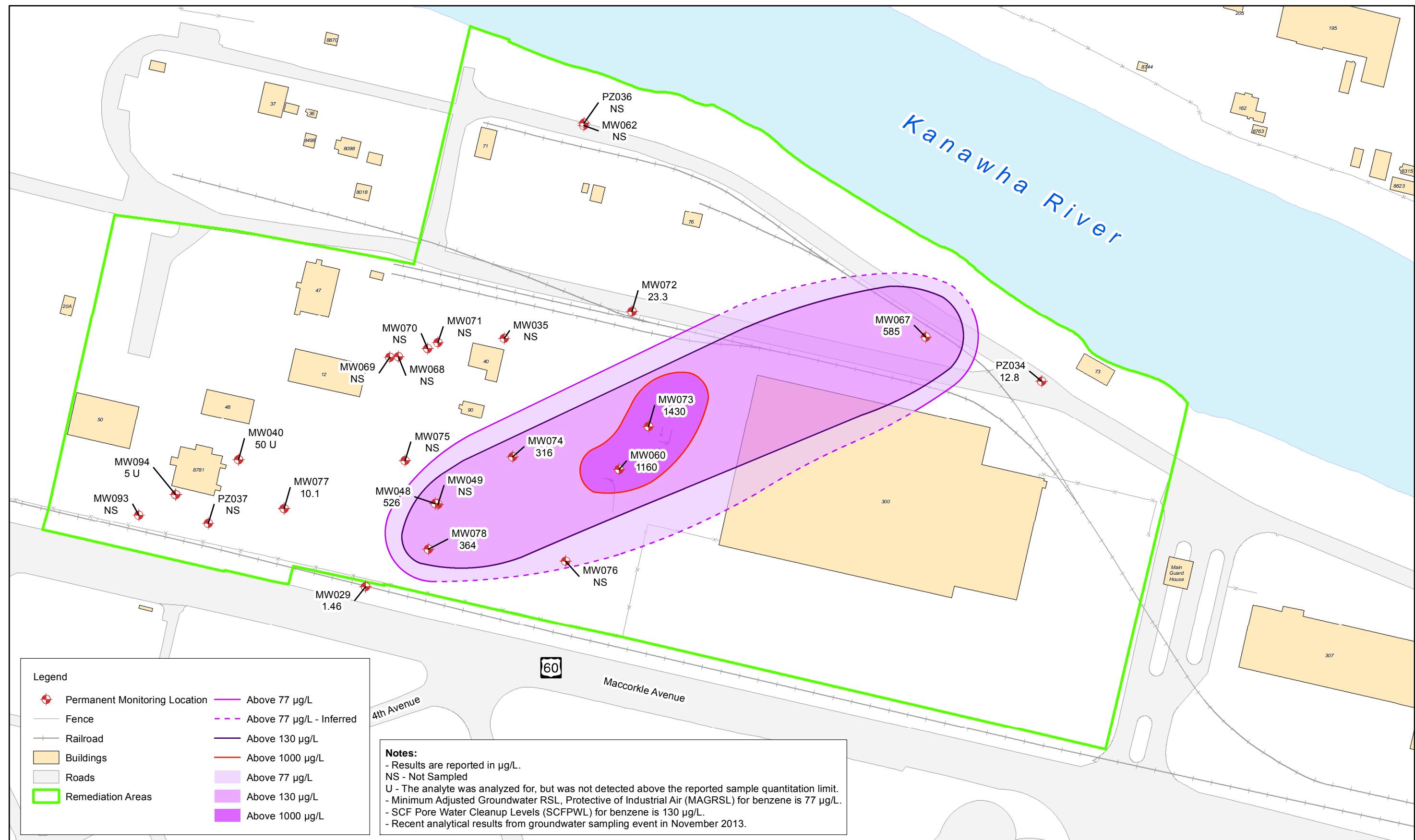


Figure 3-15  
Chlorhydrin Remediation Area Benzene Groundwater  
Concentrations - November 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia



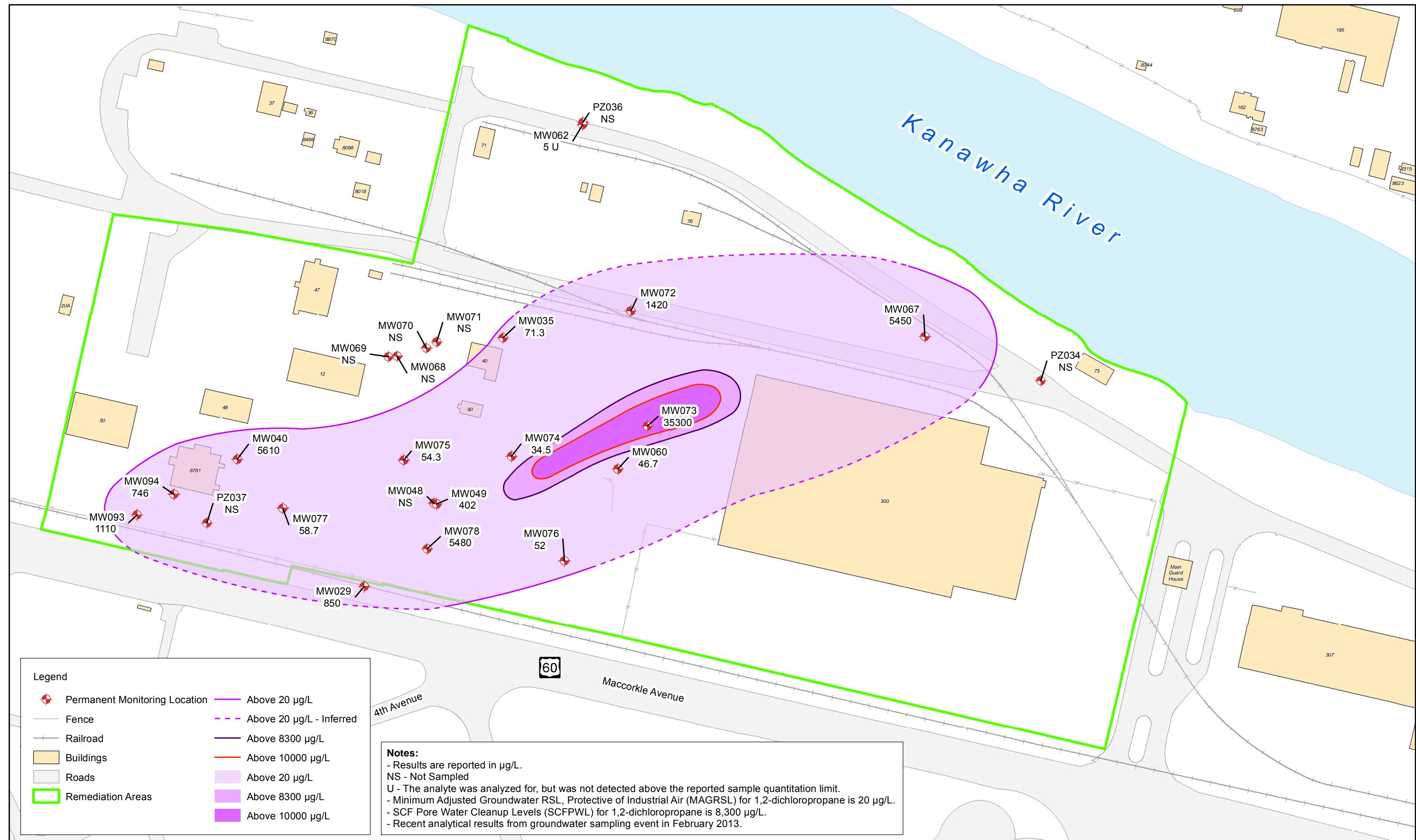


Figure 3-16  
Chlorhydrin Remediation Area 1,2-Dichloropropane Groundwater Concentrations - February 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia



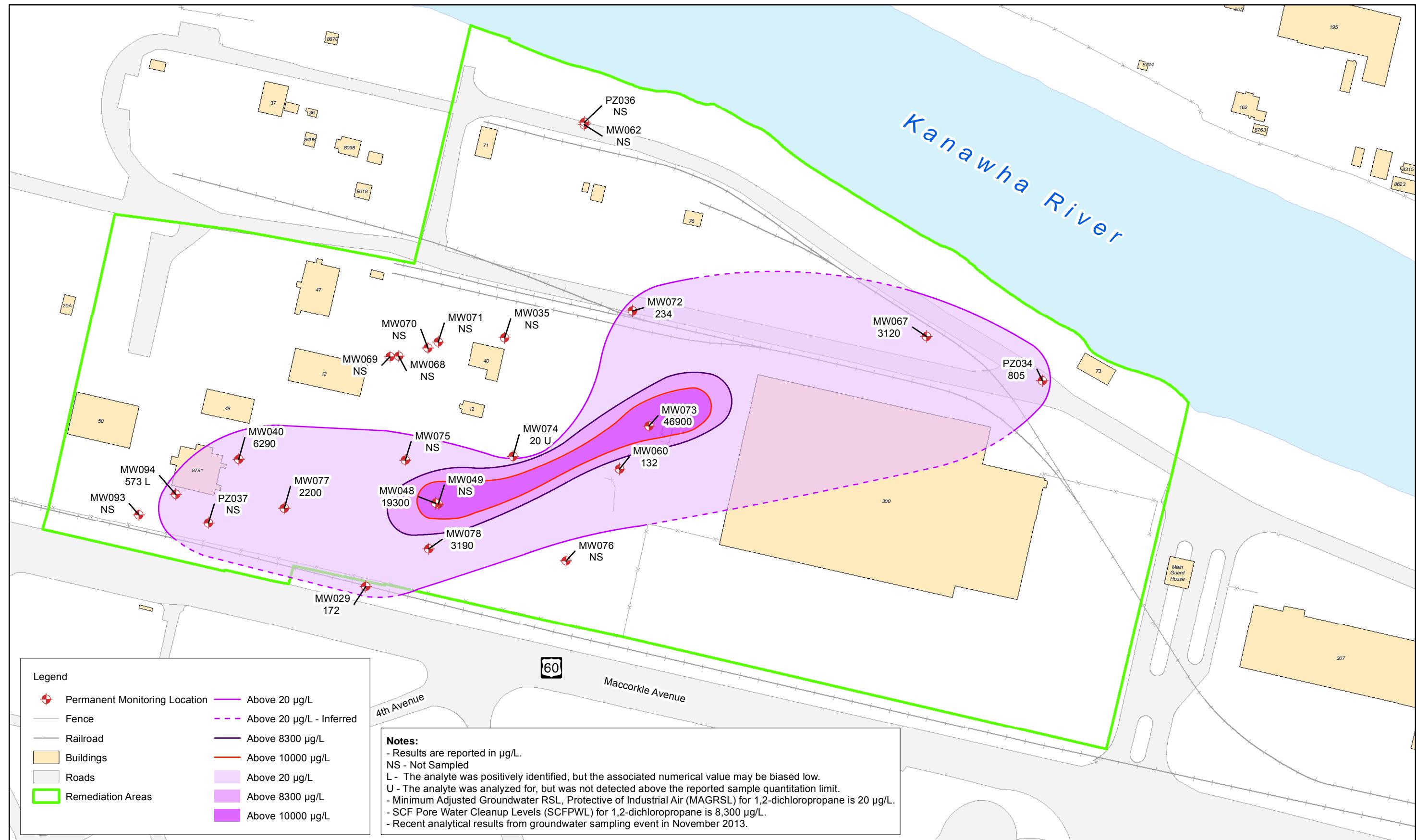


Figure 3-17  
Chlorhydrin Remediation Area 1,2-Dichloropropane Groundwater  
Concentrations - November 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia



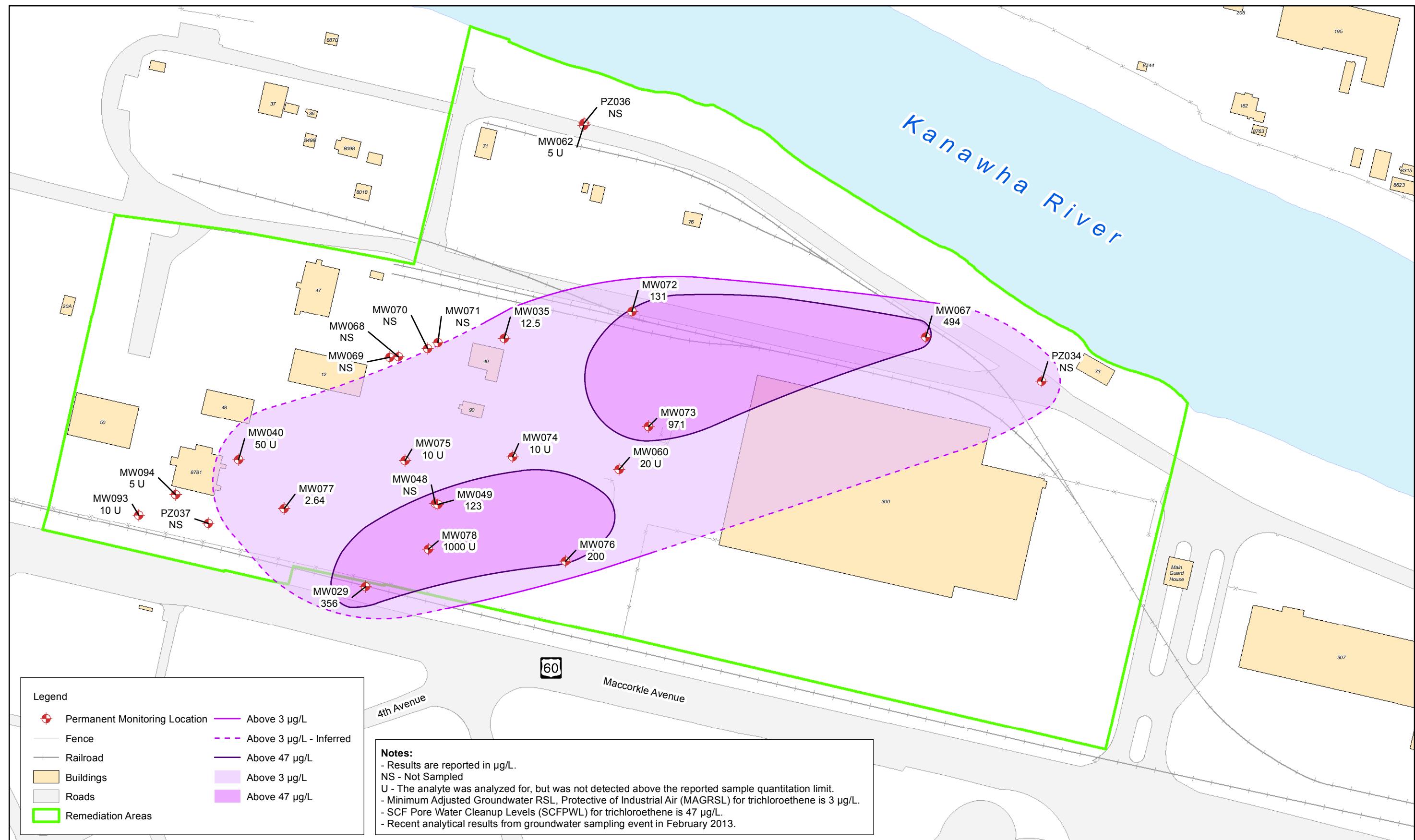


Figure 3-18  
Chlorhydrin Remediation Area Trichloroethene Groundwater  
Concentrations - February 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia

CH2MHILL



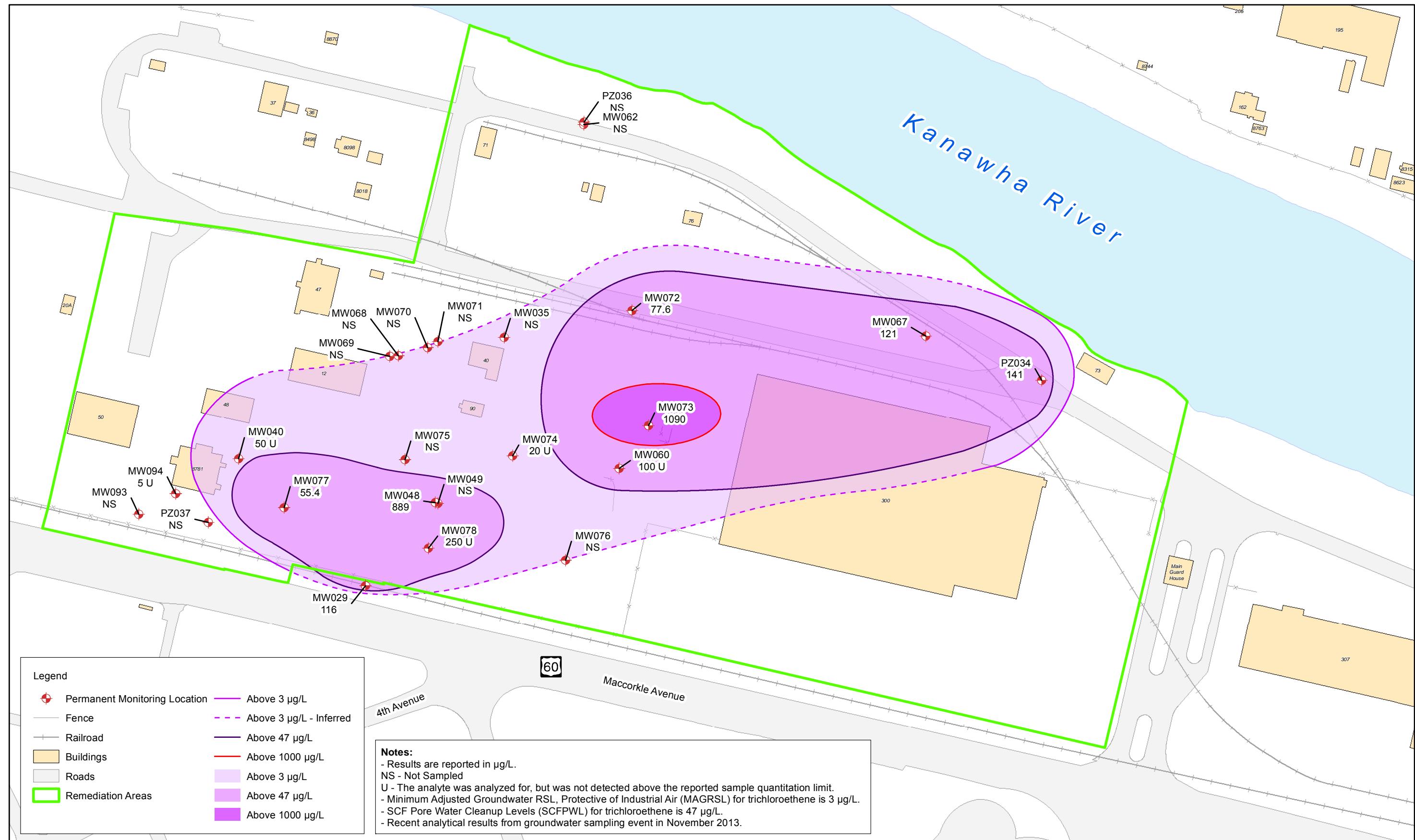


Figure 3-19  
Chlorhydrin Remediation Area Trichloroethylene Groundwater Concentrations - November 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia

CH2MHILL



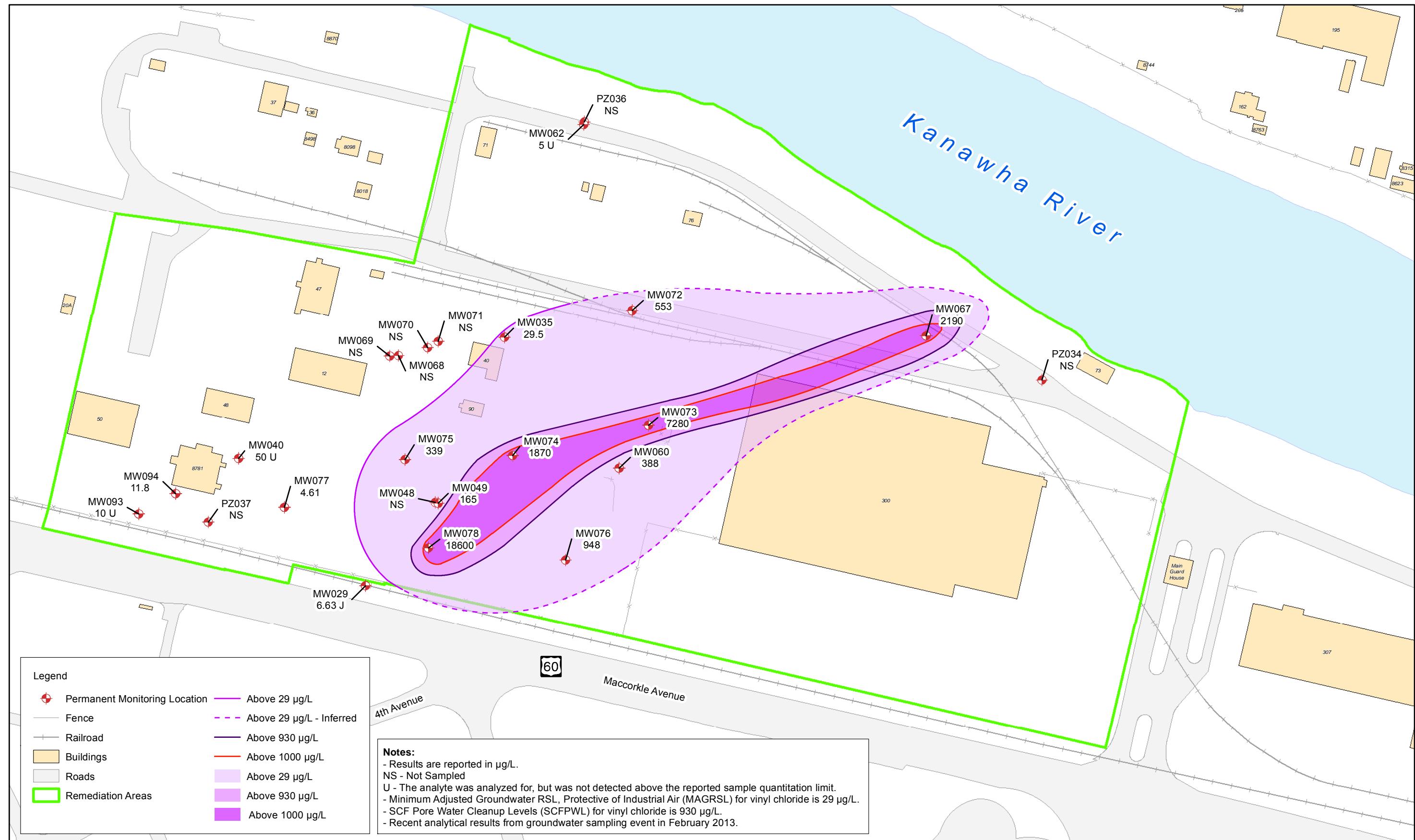


Figure 3-20  
Chlorhydrin Remediation Area Vinyl Chloride Groundwater  
Concentrations - February 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia



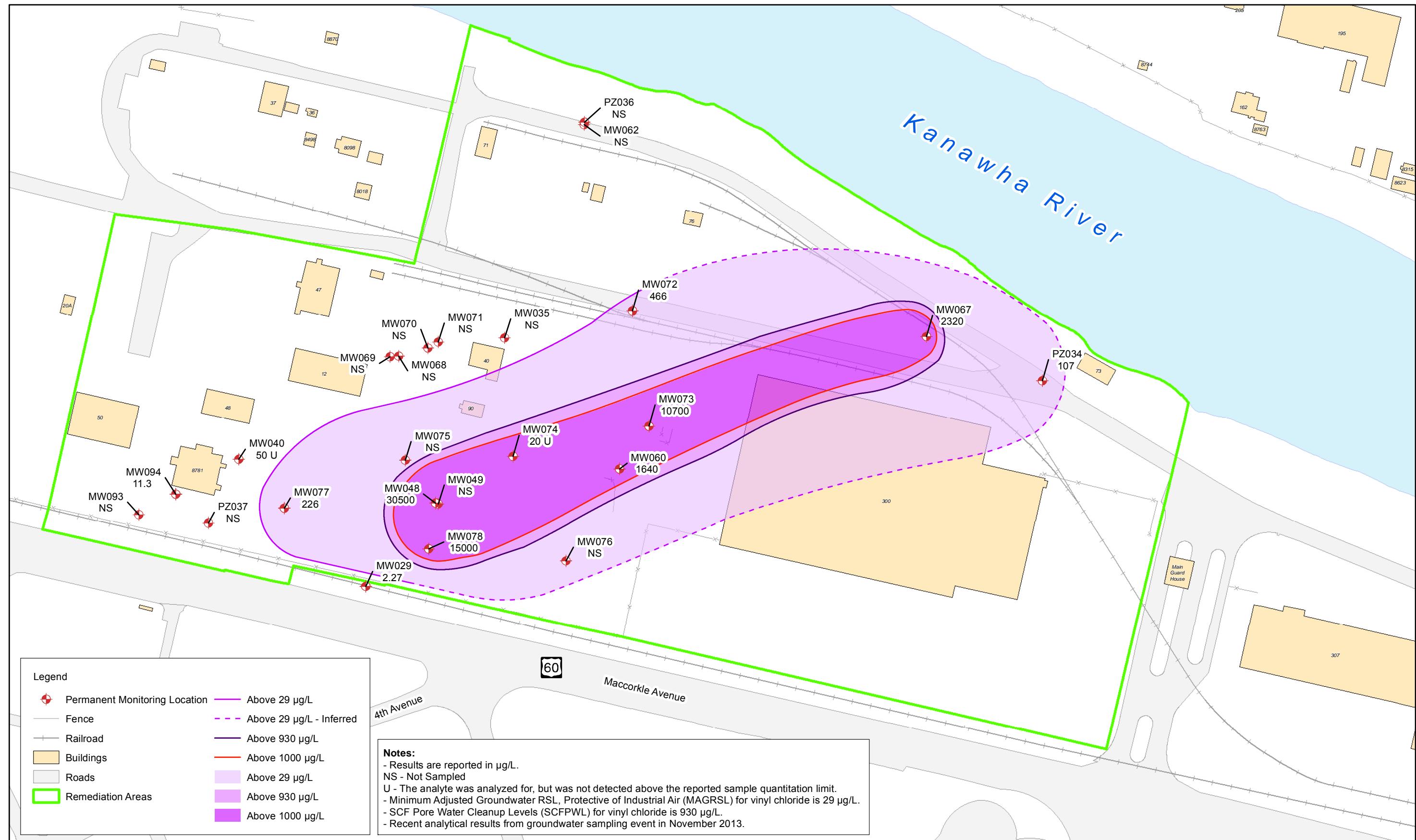


Figure 3-21  
Chlorhydrin Remediation Area Vinyl Chloride Groundwater  
Concentrations - November 2013  
2013 Groundwater Monitoring Report  
South Charleston Facility  
South Charleston, West Virginia



**Appendix A**

**Data Quality Evaluation Reports and**

**Laboratory Analytical Data Reports**

**(Provided electronically on CD)**

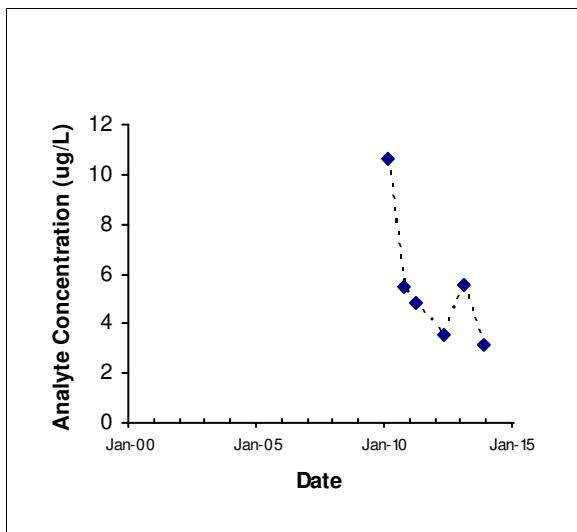
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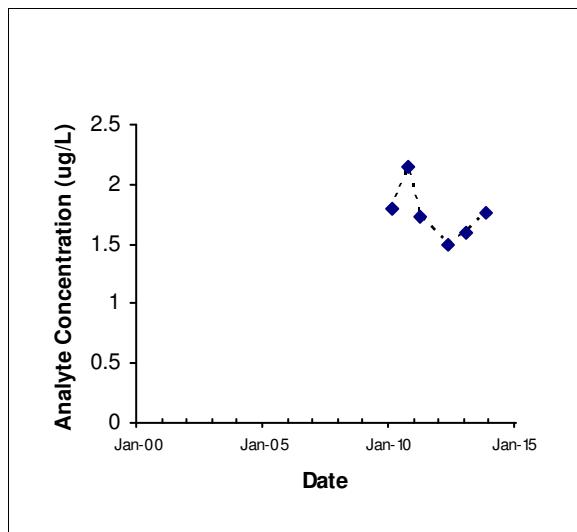
**Appendix B**  
**Chemical Time Series Trend Plots**

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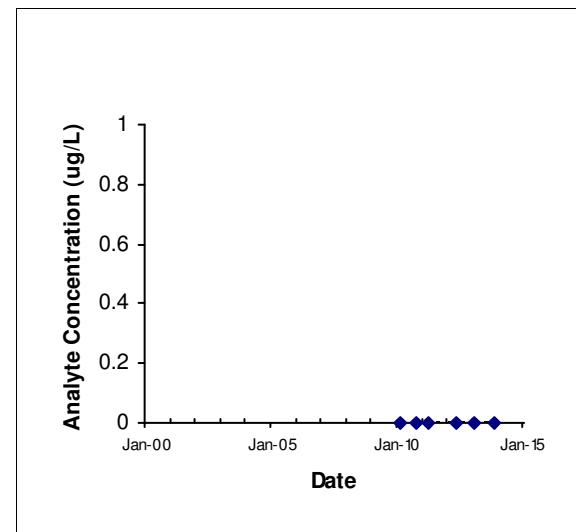




Analyte: Carbon tetrachloride Maximum 10.6



Analyte: Chloroform Maximum 2.14

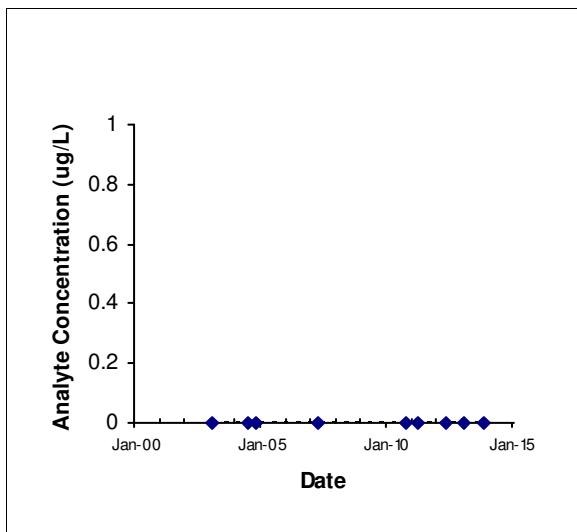


Analyte: Vinyl chloride Maximum 0

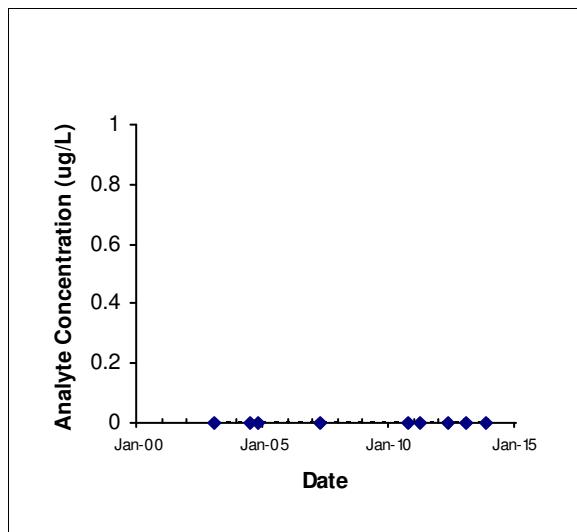
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Pore Water Clean-Up Levels shown as -----

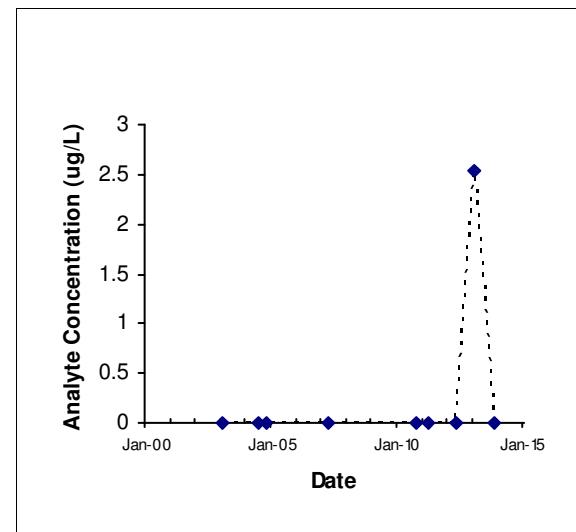
**Figure 3**  
**MW028D**  
**Building 82 Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
Page 1 of 4



Analyte: Carbon tetrachloride Maximum 0



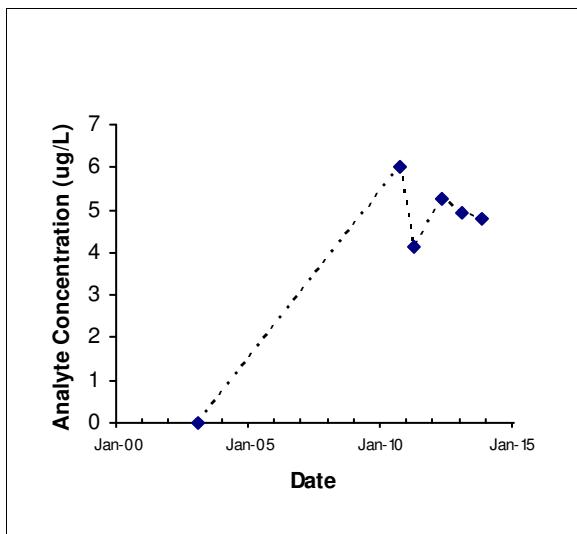
Analyte: Chloroform Maximum 0



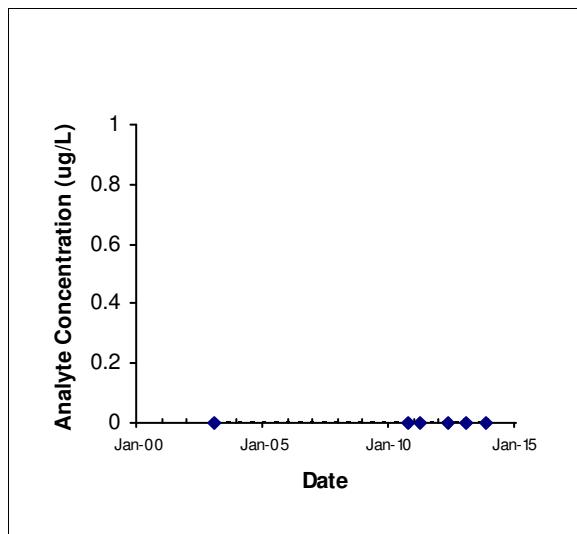
Analyte: Vinyl chloride Maximum 2.53

\* Nondetects shown as 0

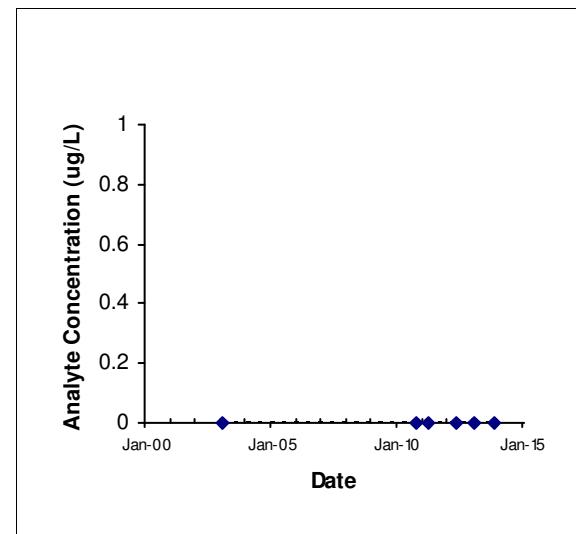
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Analyte: Carbon tetrachloride      Maximum      6.01



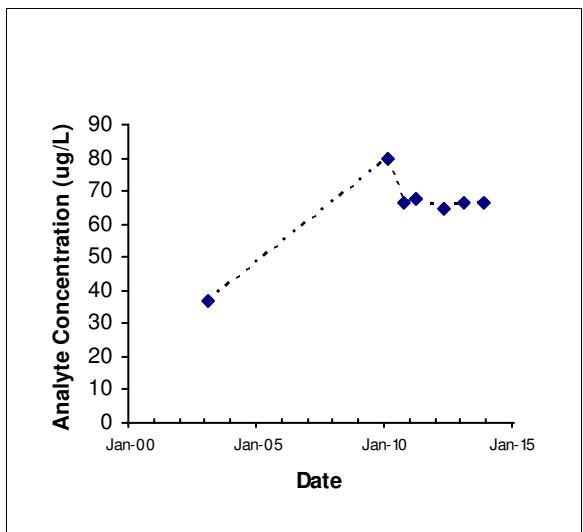
Analyte: Chloroform      Maximum      0



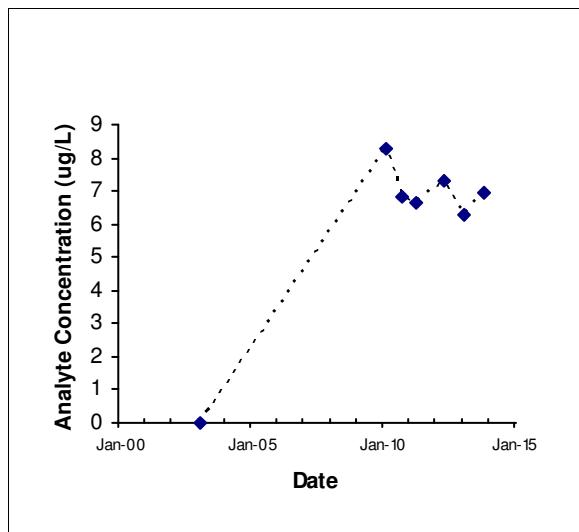
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\* Nondetects shown as 0

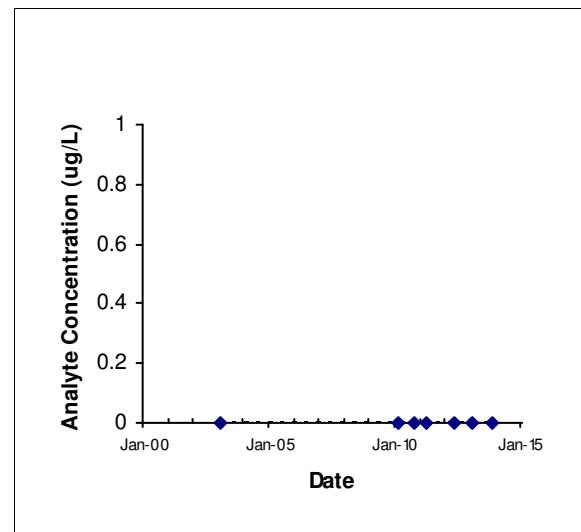
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Analyte: Carbon tetrachloride      Maximum 79.7



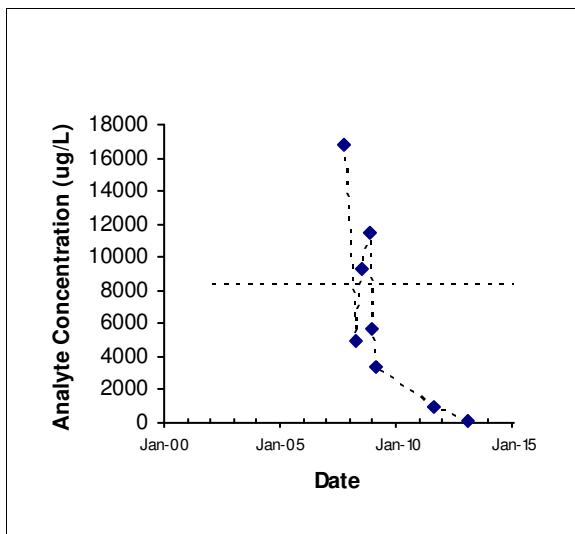
Analyte: Chloroform      Maximum 8.25



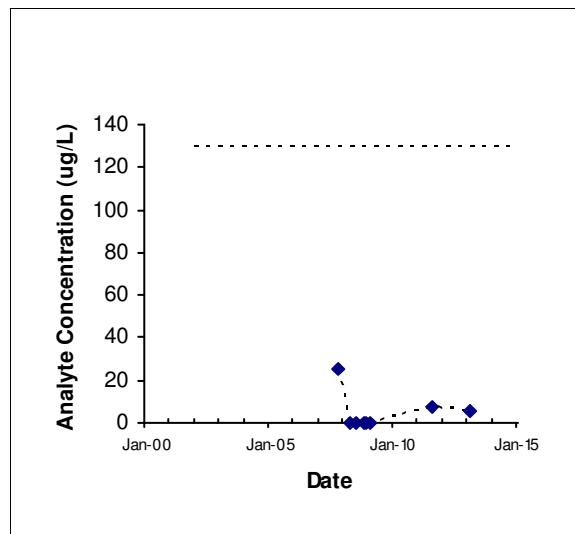
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\* Nondetects shown as 0

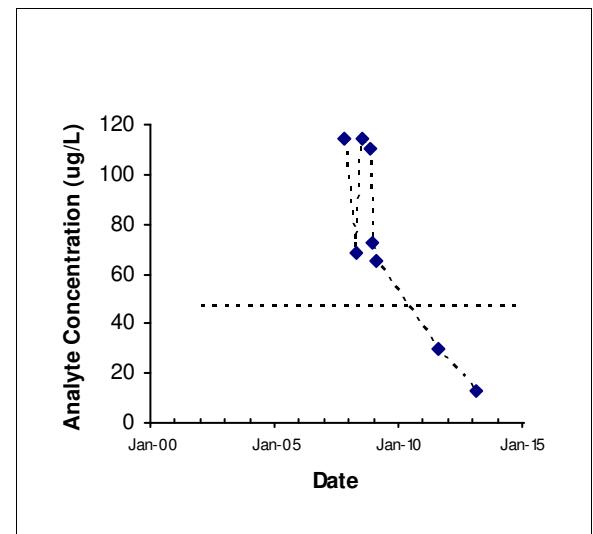
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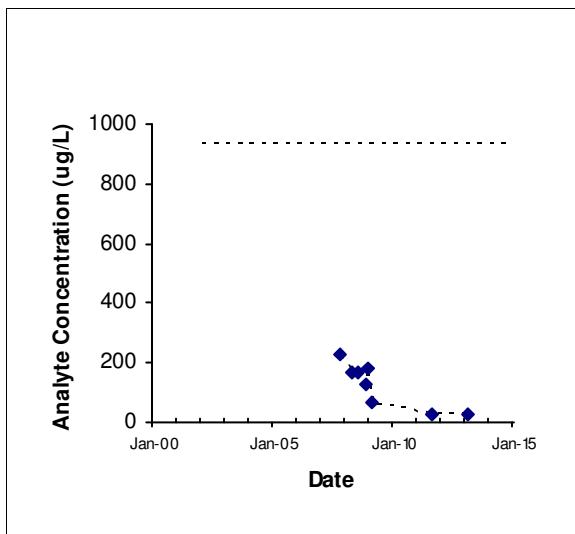
Analyte: 1,2-Dichloropropane Maximum 16800



Analyte: Benzene Maximum 24.9



Analyte: TCE Maximum 114



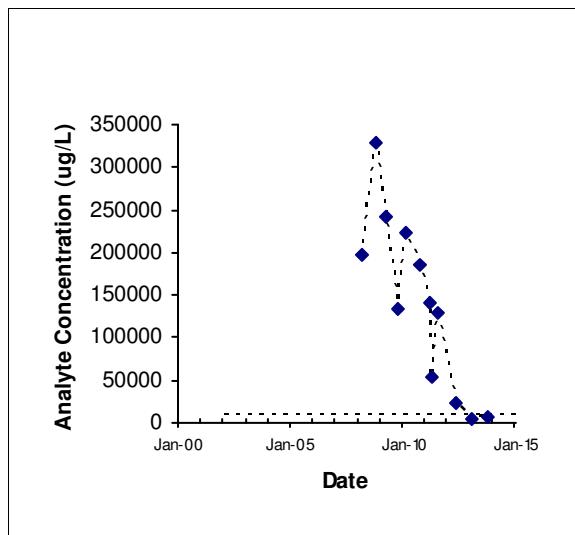
Analyte: Vinyl chloride Maximum 227

\* Nondetects shown as 0

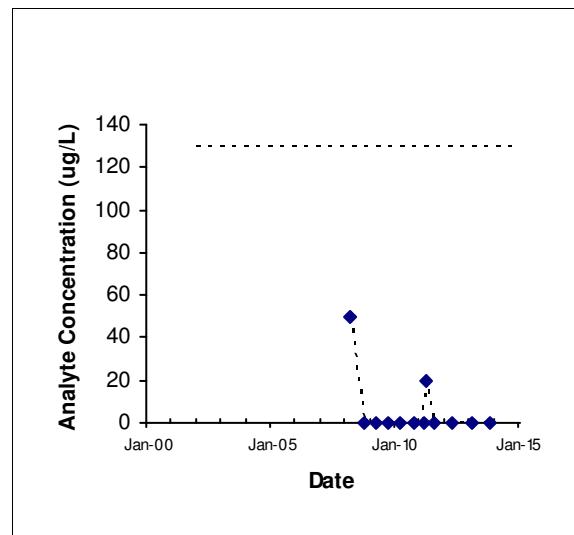
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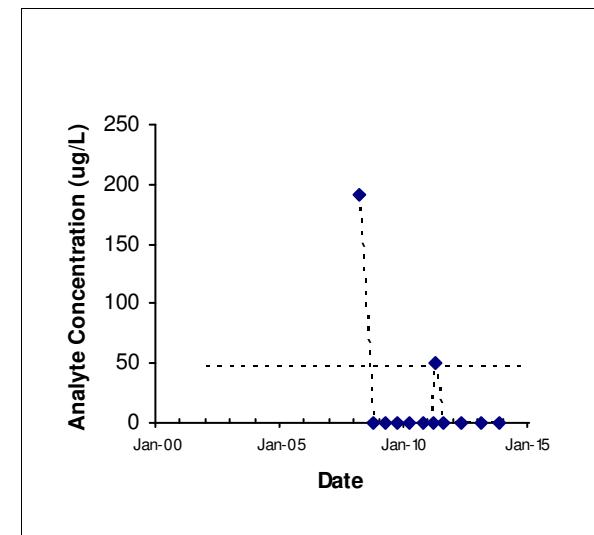
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**MW035**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
Page 1 of 22



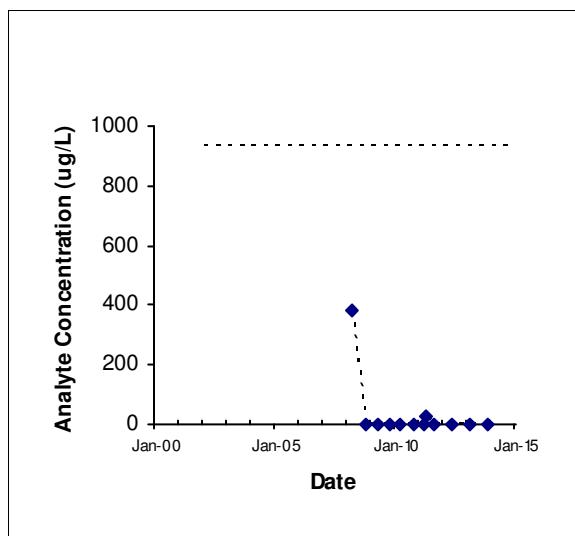
Analyte: 1,2-Dichloropropane Maximum 328000



Analyte: Benzene Maximum 49.4



Analyte: TCE Maximum 192



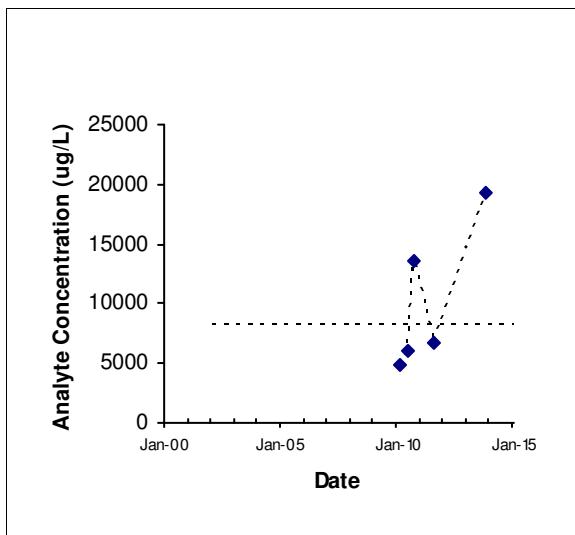
Analyte: Vinyl chloride Maximum 380

\* Nondetects shown as 0

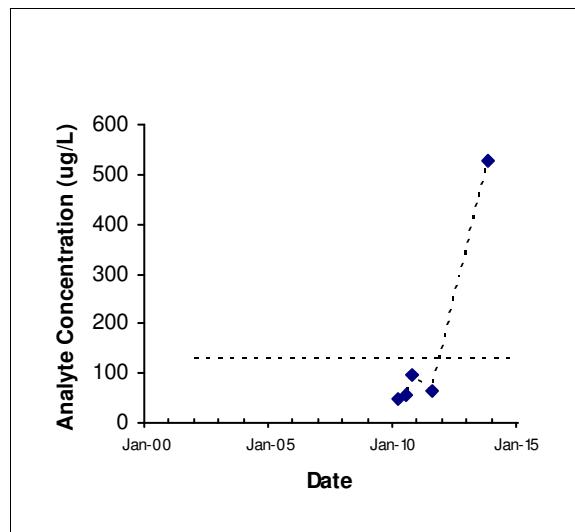
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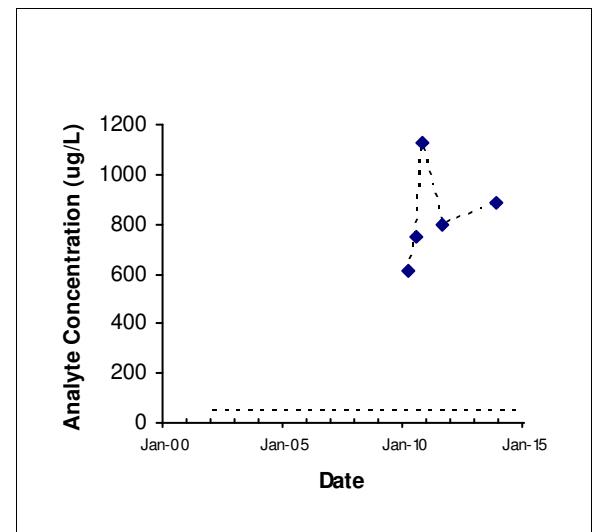
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**MW040**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
Page 2 of 22



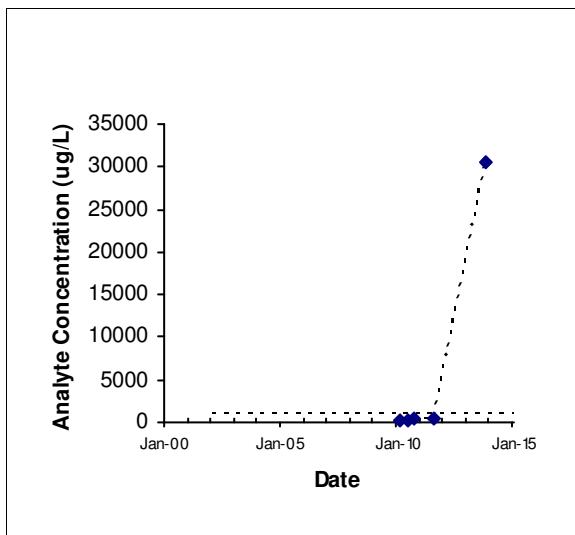
Analyte: 1,2-Dichloropropane      Maximum      19300



Analyte: Benzene      Maximum      526



Analyte: TCE      Maximum      1130



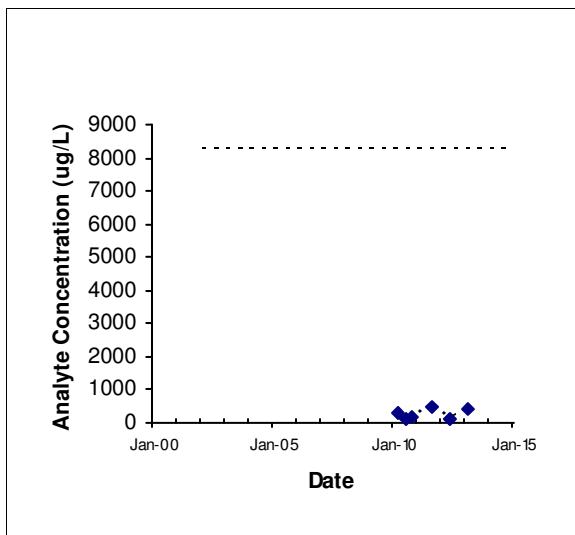
Analyte: Vinyl chloride      Maximum      30500

\* Nondetects shown as 0

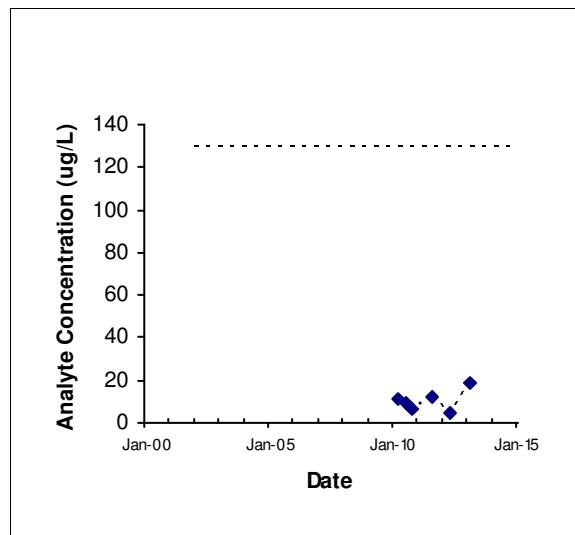
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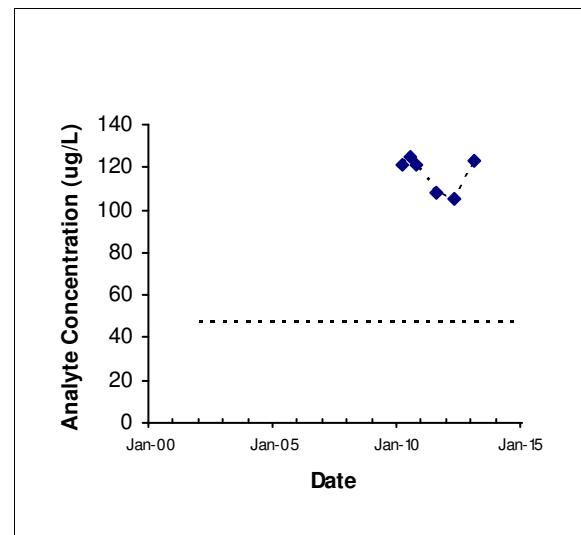
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**MW048**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
Page 3 of 22



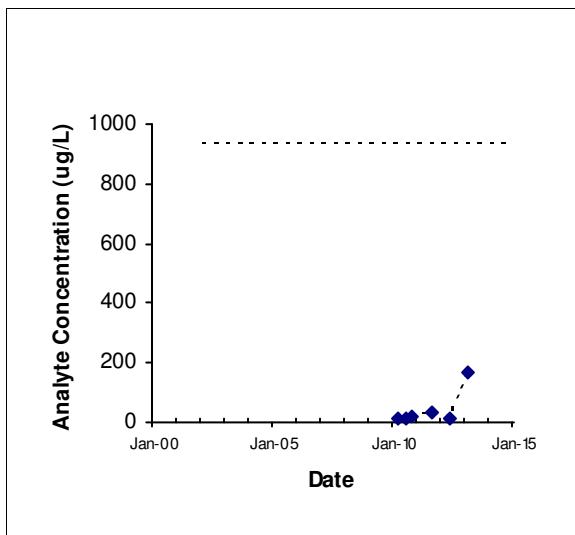
Analyte: 1,2-Dichloropropane Maximum 466



Analyte: Benzene Maximum 18.5



Analyte: TCE Maximum 125



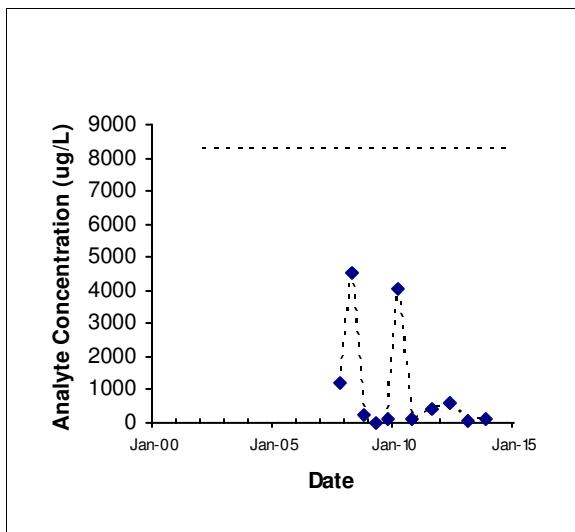
Analyte: Vinyl chloride Maximum 165

\* Nondetects shown as 0

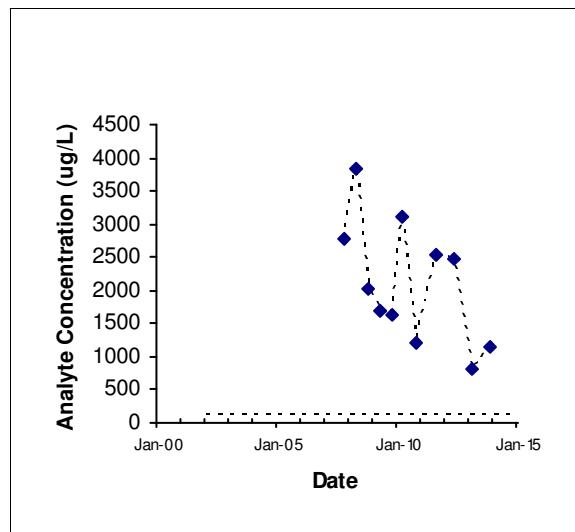
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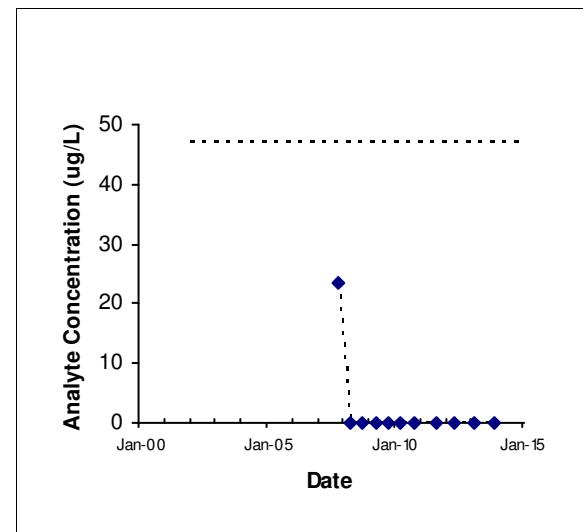
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**MW049**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**



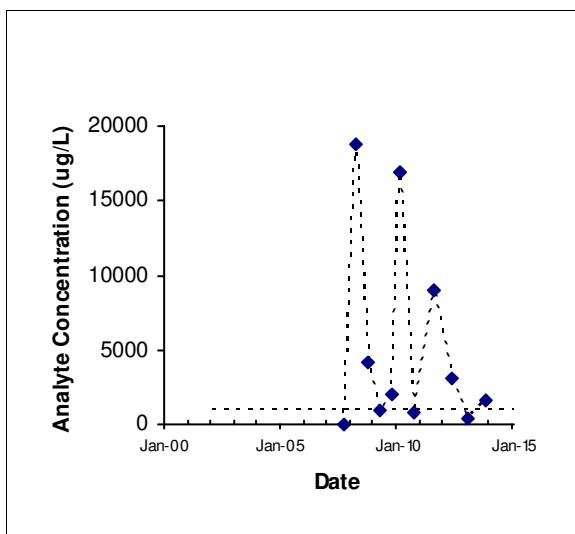
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Analyte: Benzene Maximum 3850



Analyte: TCE Maximum 23.5



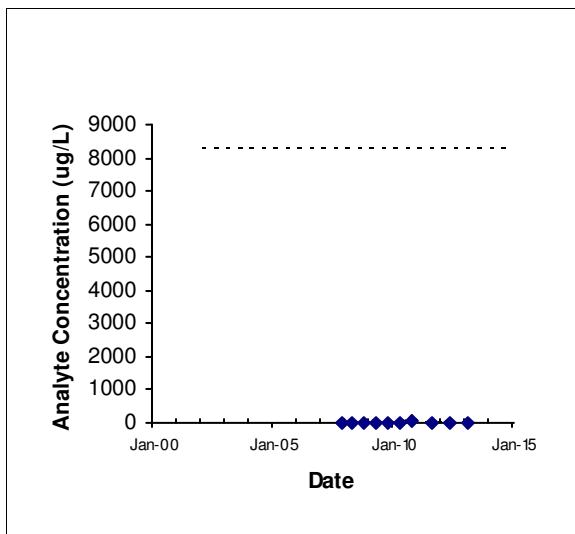
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\* Nondetects shown as 0

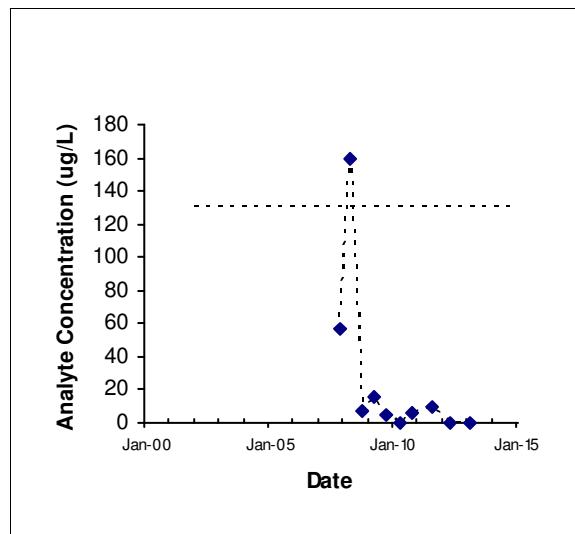
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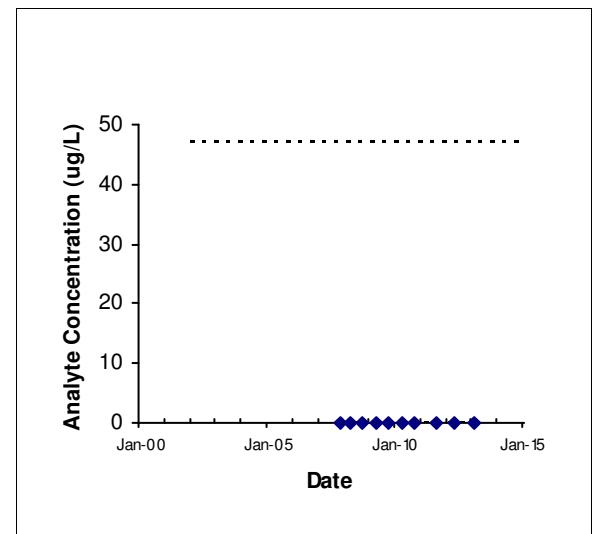
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**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
Page 5 of 22



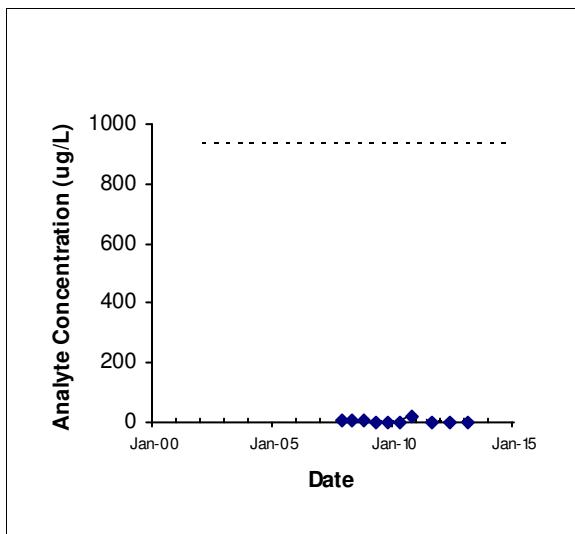
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Analyte: Benzene Maximum 159



Analyte: TCE Maximum 0



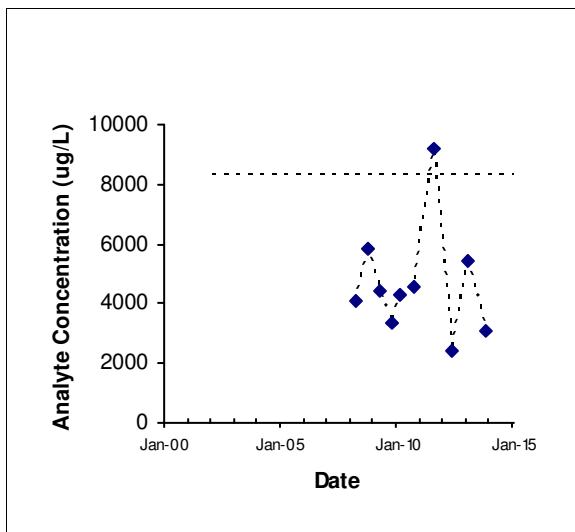
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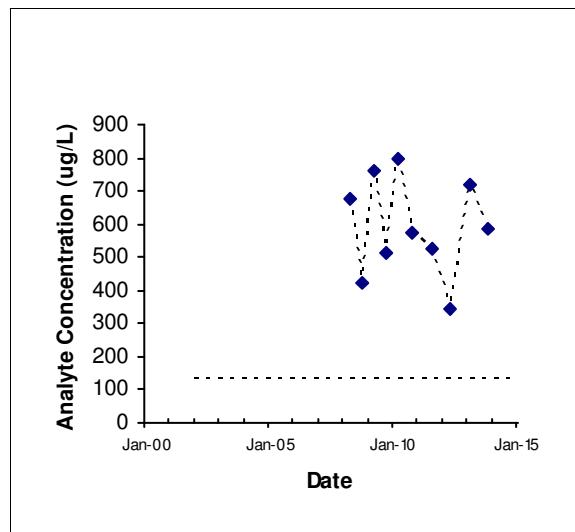
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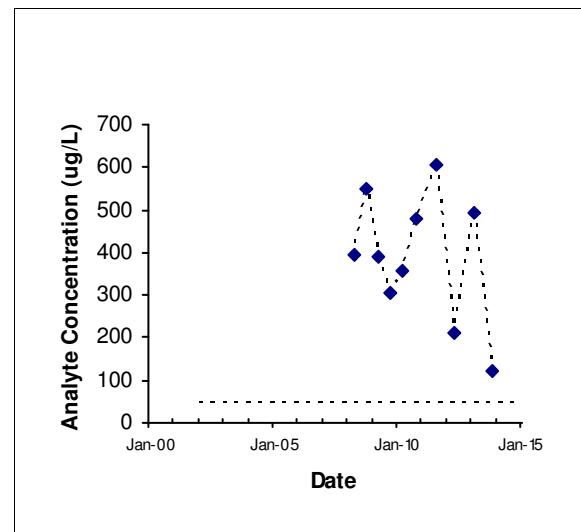
**Figure 2**  
**MW062**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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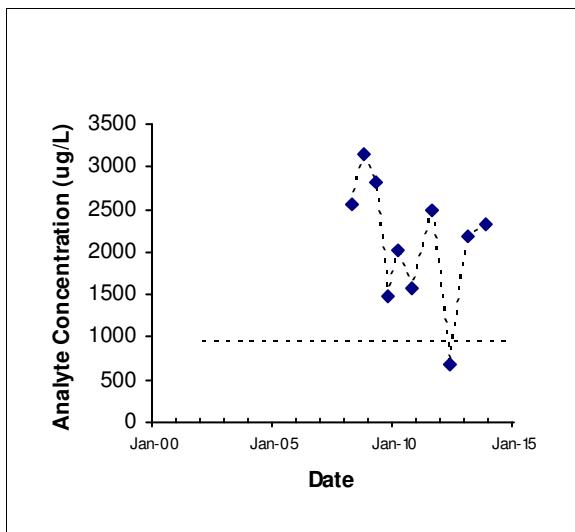
Analyte: 1,2-Dichloropropane      Maximum      9180



Analyte: Benzene      Maximum      795



Analyte: TCE      Maximum      607



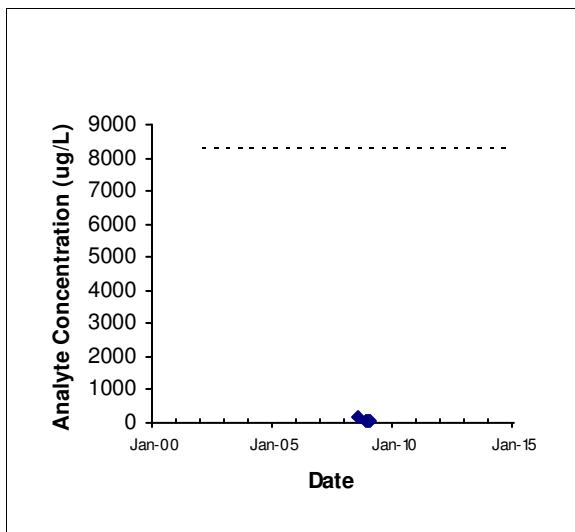
Analyte: Vinyl chloride      Maximum      3150

\* Nondetects shown as 0

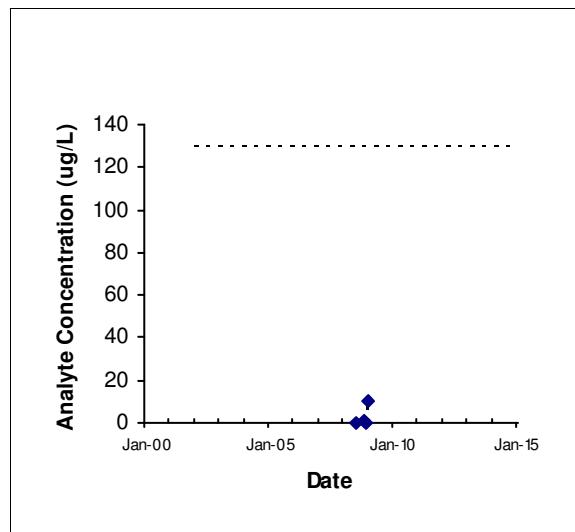
Pore Water Clean-Up Levels shown as -----

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rptTimeSeries  
mspence; 29-Apr-2014 15:34

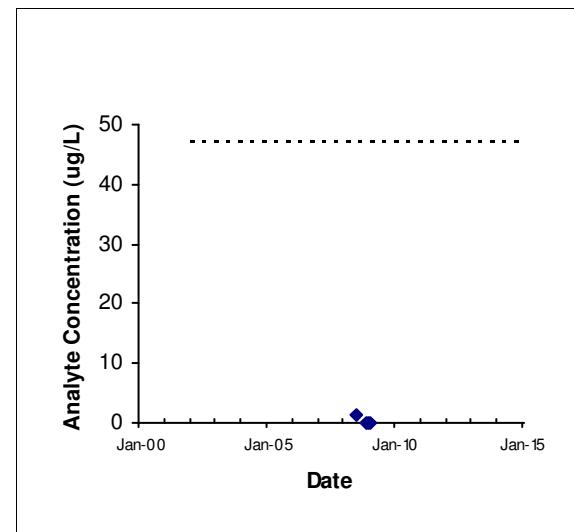
**Figure 2**  
**MW067**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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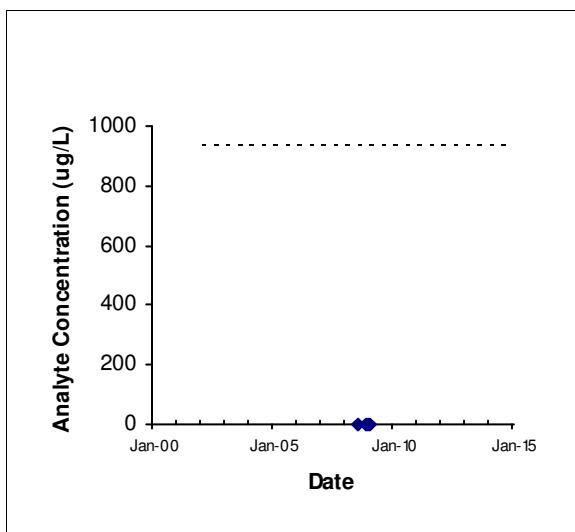
Analyte: 1,2-Dichloropropane Maximum 192



Analyte: Benzene Maximum 10.3



Analyte: TCE Maximum 1.24



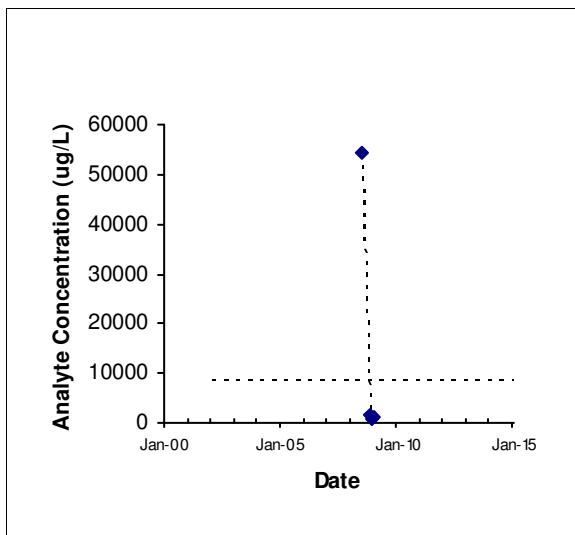
Analyte: Vinyl chloride Maximum 0

\* Nondetects shown as 0

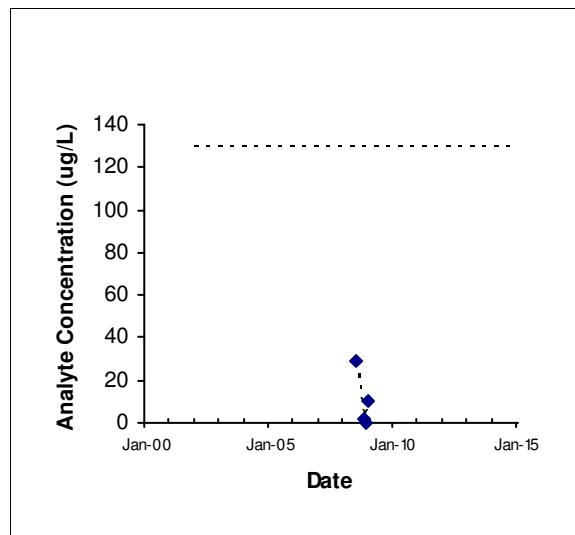
Pore Water Clean-Up Levels shown as -----

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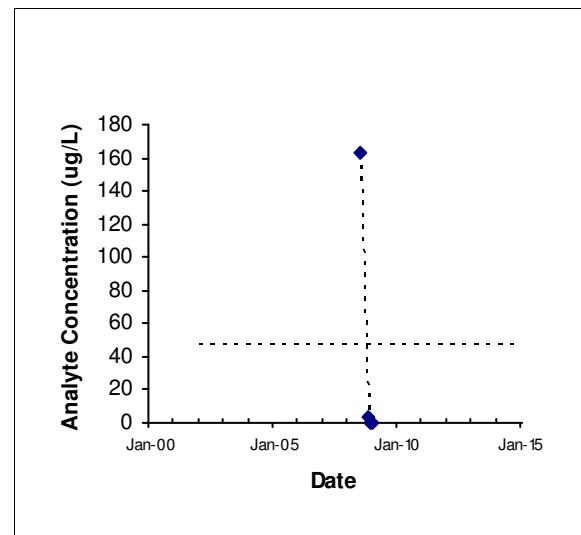
**Figure 2**  
**MW068**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**



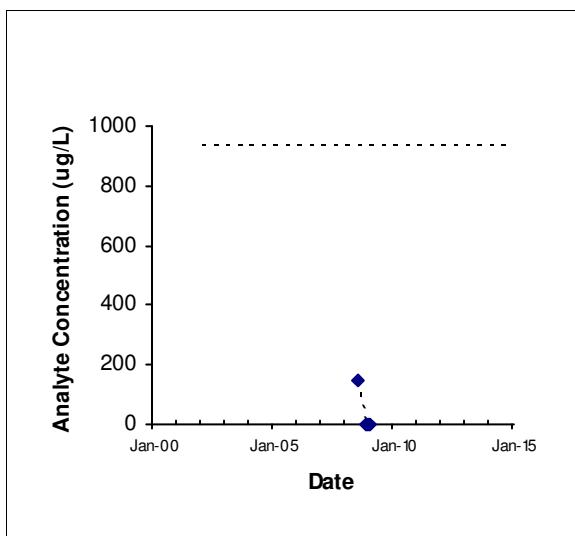
Analyte: 1,2-Dichloropropane Maximum 54400



Analyte: Benzene Maximum 29



Analyte: TCE Maximum 163



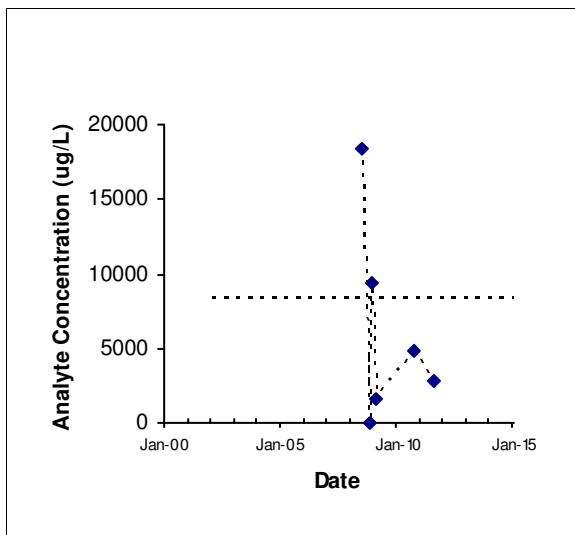
Analyte: Vinyl chloride Maximum 149

\* Nondetects shown as 0

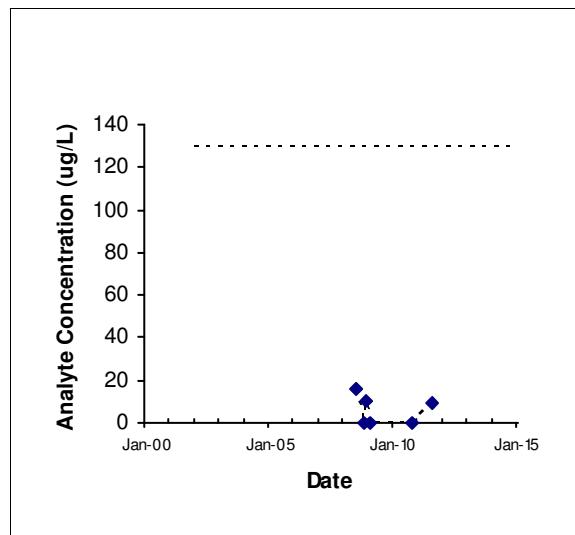
Pore Water Clean-Up Levels shown as -----

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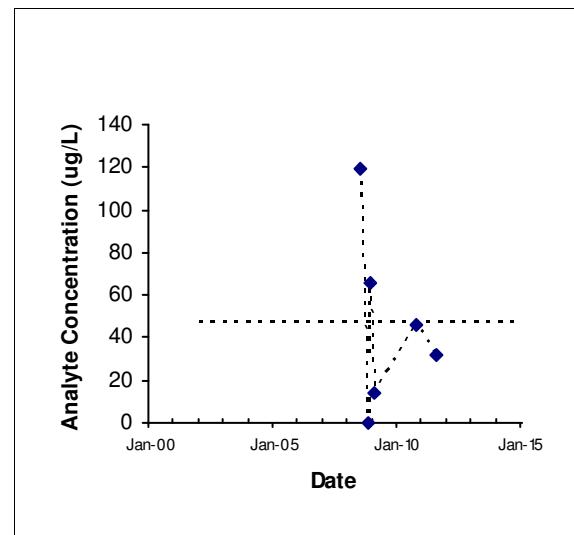
**Figure 2**  
**MW069**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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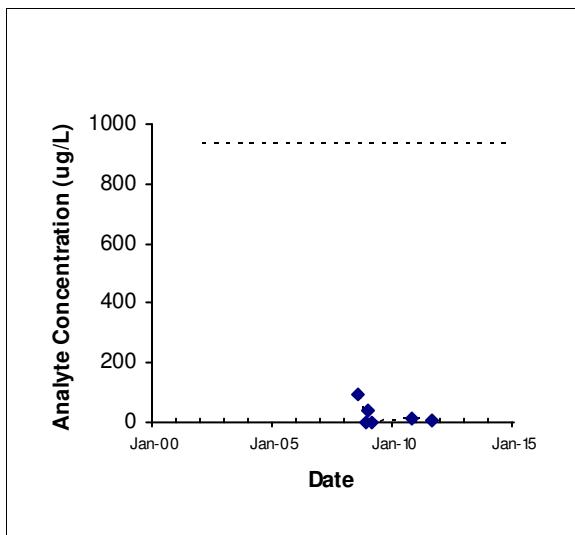
Analyte: 1,2-Dichloropropane      Maximum      18400



Analyte: Benzene      Maximum      16.3



Analyte: TCE      Maximum      119



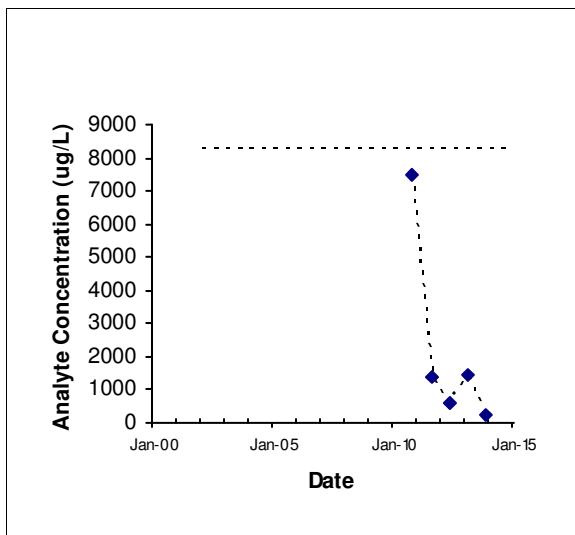
Analyte: Vinyl chloride      Maximum      96.2

\* Nondetects shown as 0

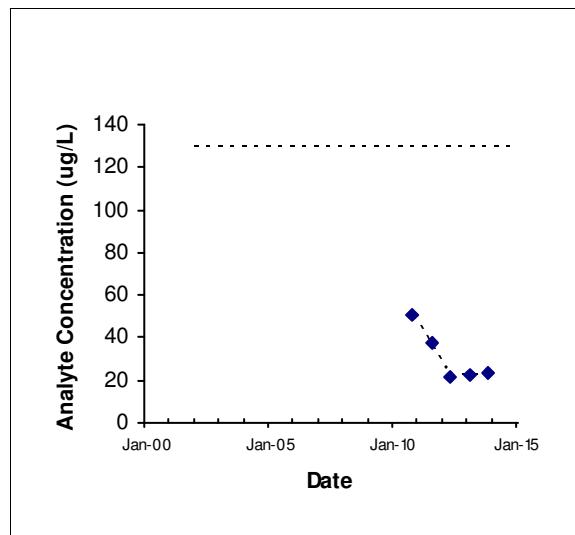
Pore Water Clean-Up Levels shown as -----

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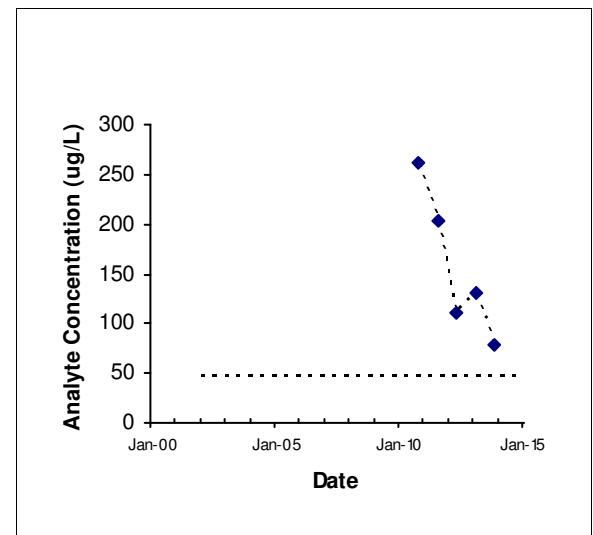
**Figure 2**  
**MW071**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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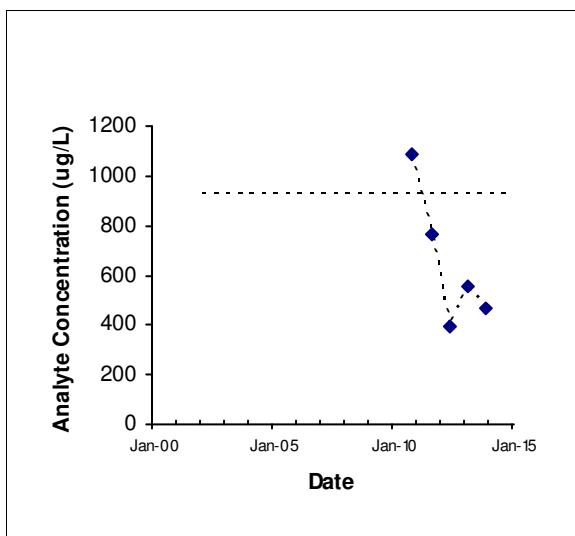
Analyte: 1,2-Dichloropropane Maximum 7490



Analyte: Benzene Maximum 51.2



Analyte: TCE Maximum 261



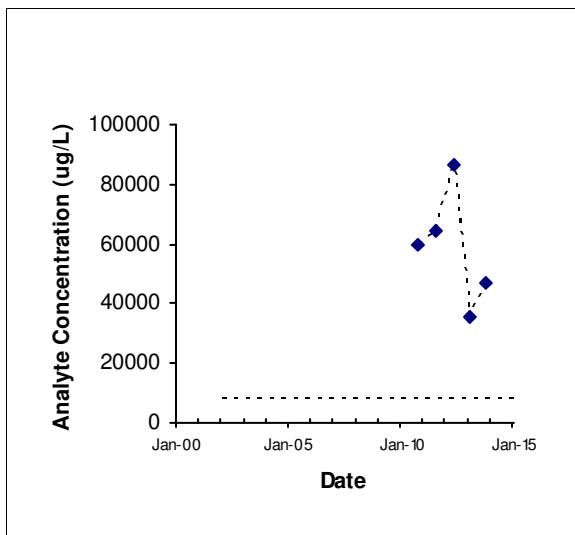
Analyte: Vinyl chloride Maximum 1090

\* Nondetects shown as 0

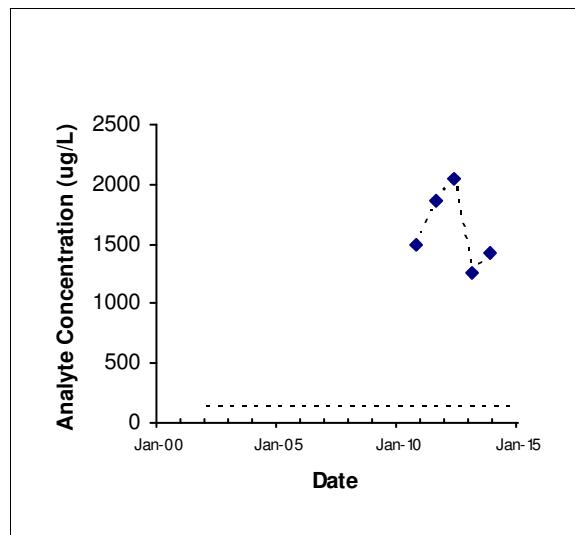
Pore Water Clean-Up Levels shown as -----

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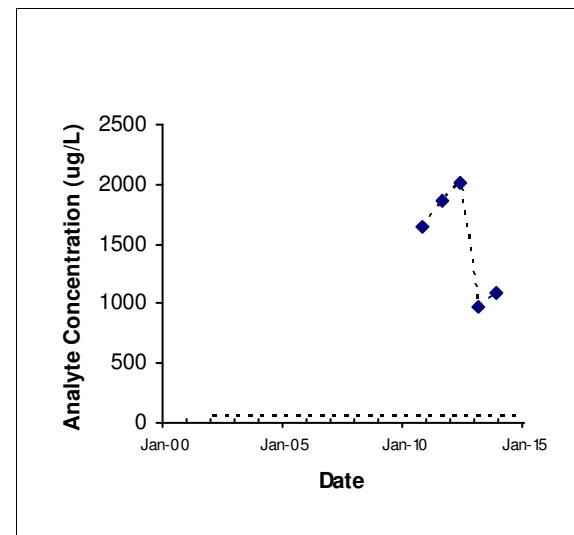
**Figure 2**  
**MW072**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**



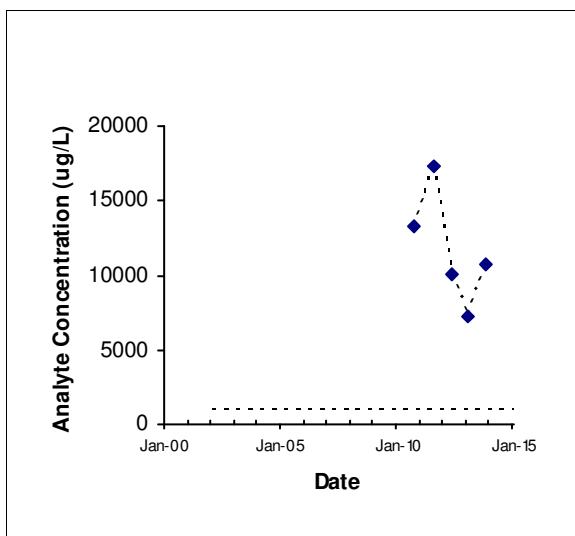
Analyte: 1,2-Dichloropropane      Maximum      86900



Analyte: Benzene      Maximum      2040



Analyte: TCE      Maximum      2010



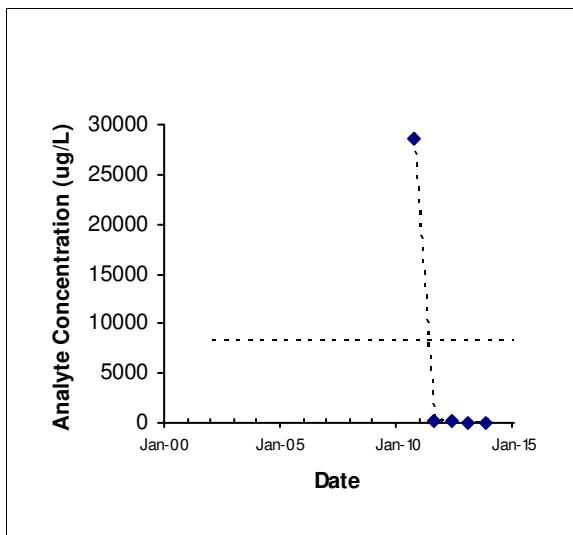
Analyte: Vinyl chloride      Maximum      17300

\* Nondetects shown as 0

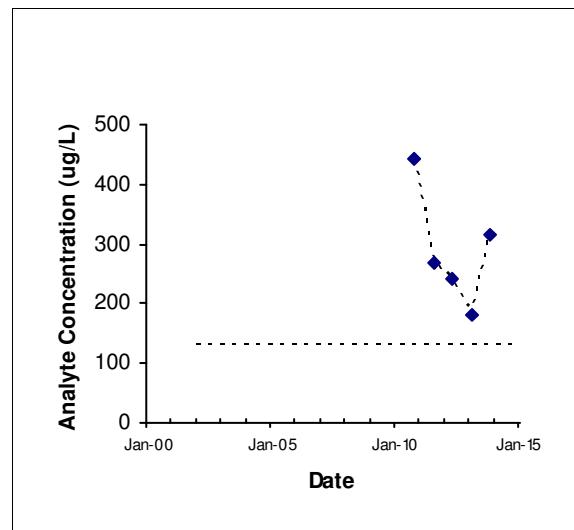
Pore Water Clean-Up Levels shown as -----

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rptTimeSeries  
mspence; 29-Apr-2014 15:34

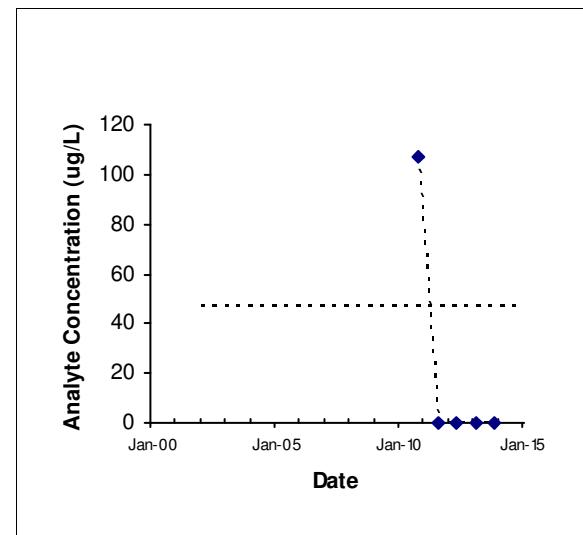
**Figure 2**  
**MW073**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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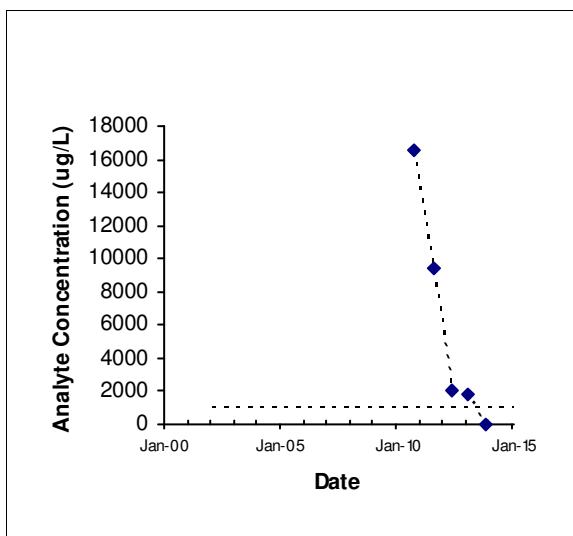
Analyte: 1,2-Dichloropropane      Maximum      28500



Analyte: Benzene      Maximum      443



Analyte: TCE      Maximum      107



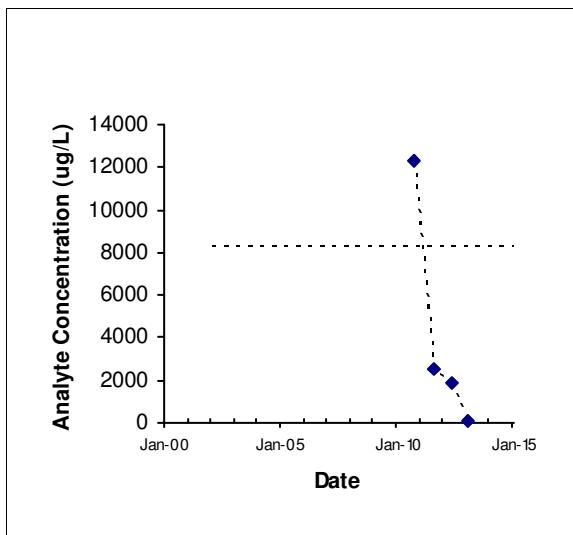
Analyte: Vinyl chloride      Maximum      16500

\* Nondetects shown as 0

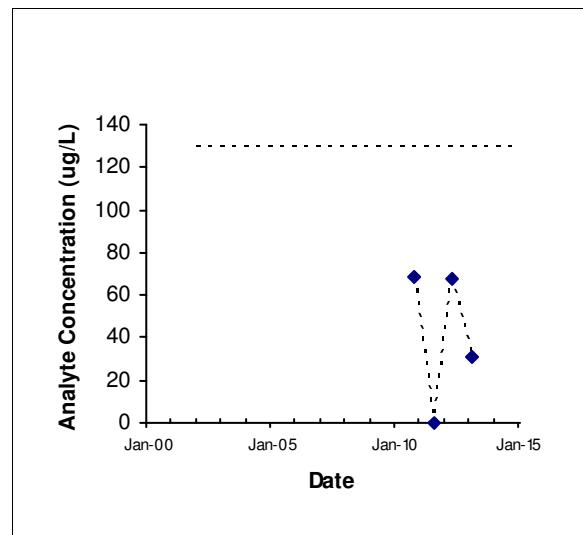
Pore Water Clean-Up Levels shown as -----

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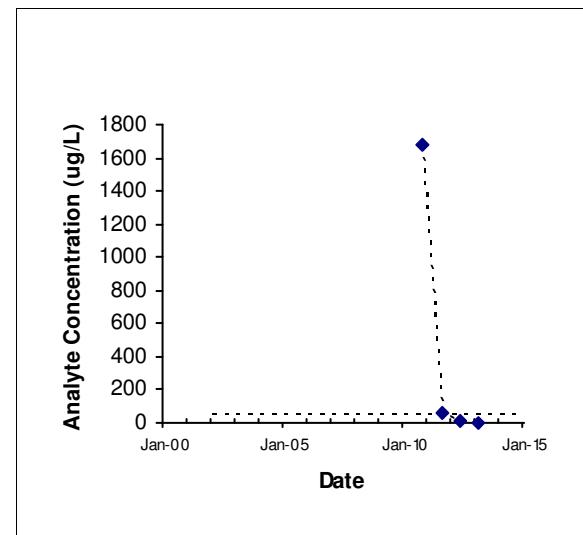
**Figure 2**  
**MW074**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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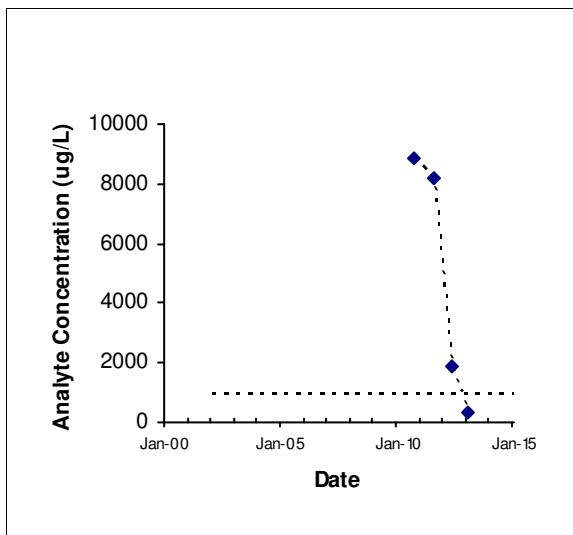
Analyte: 1,2-Dichloropropane Maximum 12300



Analyte: Benzene Maximum 68.5



Analyte: TCE Maximum 1680



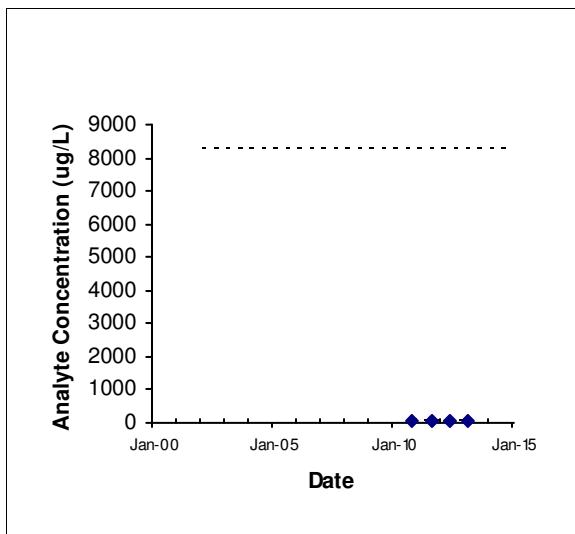
Analyte: Vinyl chloride Maximum 8850

\* Nondetects shown as 0

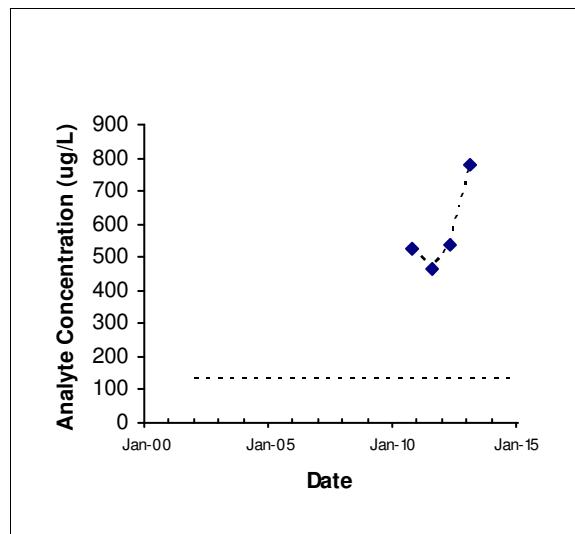
Pore Water Clean-Up Levels shown as -----

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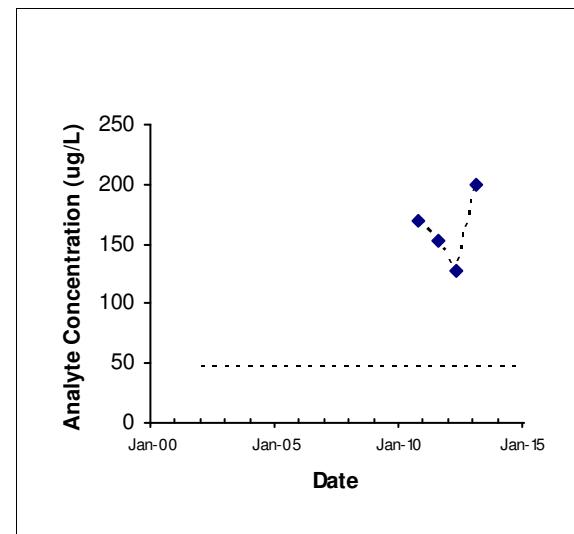
**Figure 2**  
**MW075**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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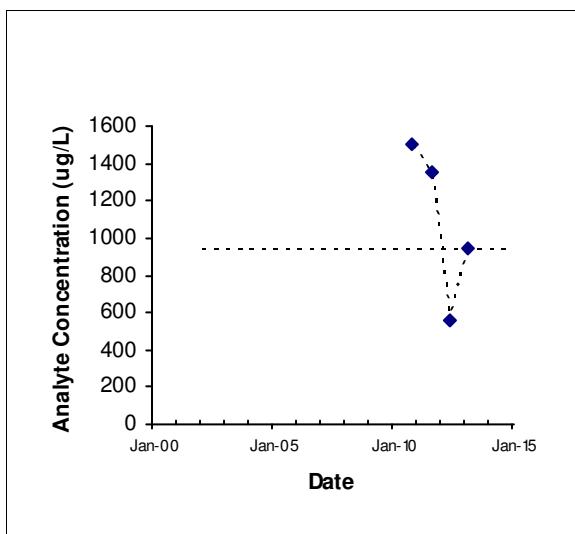
Analyte: 1,2-Dichloropropane      Maximum      89.7



Analyte: Benzene      Maximum      781



Analyte: TCE      Maximum      200



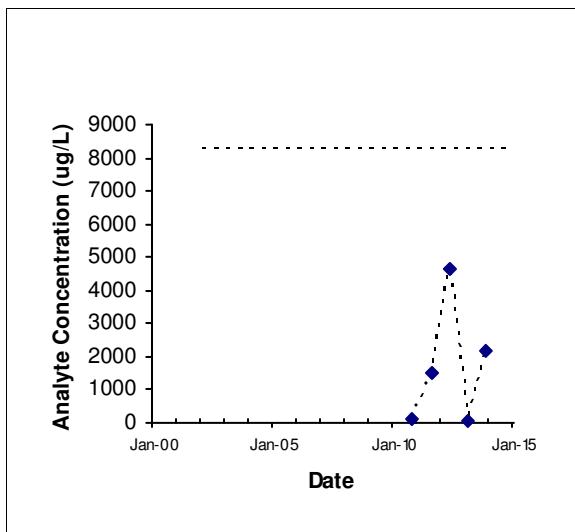
Analyte: Vinyl chloride      Maximum      1500

\* Nondetects shown as 0

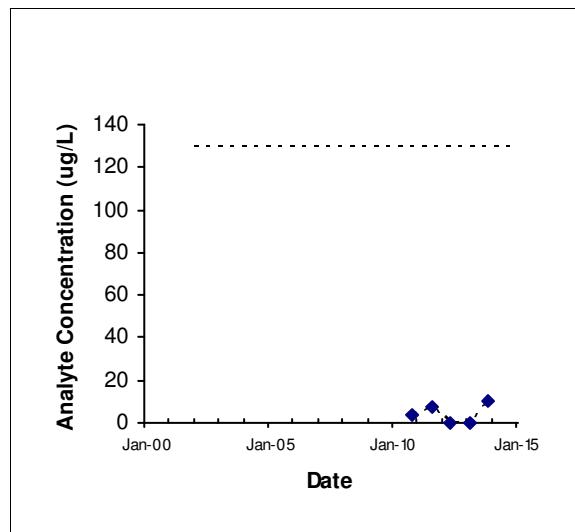
Pore Water Clean-Up Levels shown as -----

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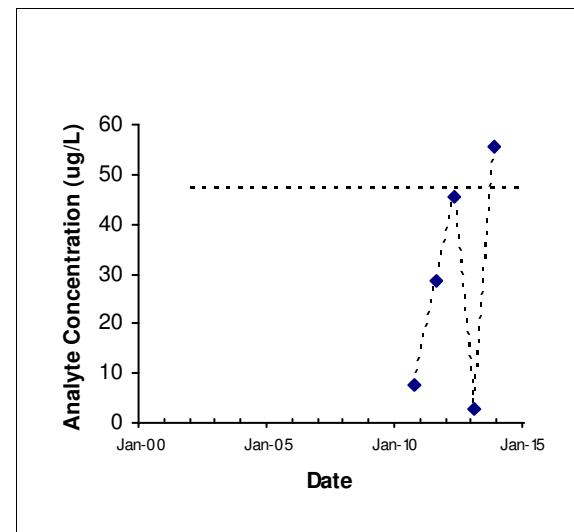
**Figure 2**  
**MW076**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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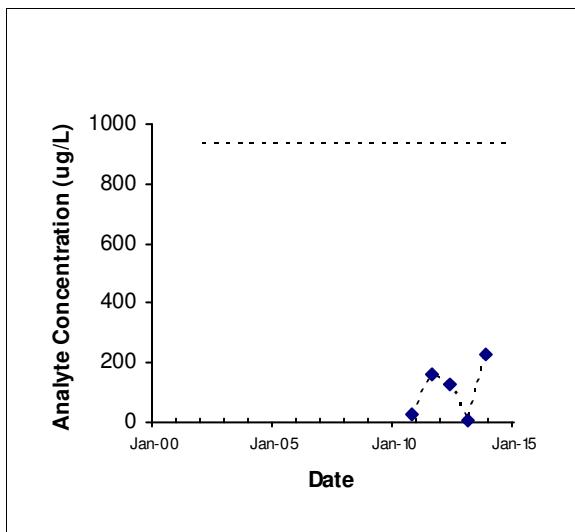
Analyte: 1,2-Dichloropropane Maximum 4670



Analyte: Benzene Maximum 10.1



Analyte: TCE Maximum 55.4



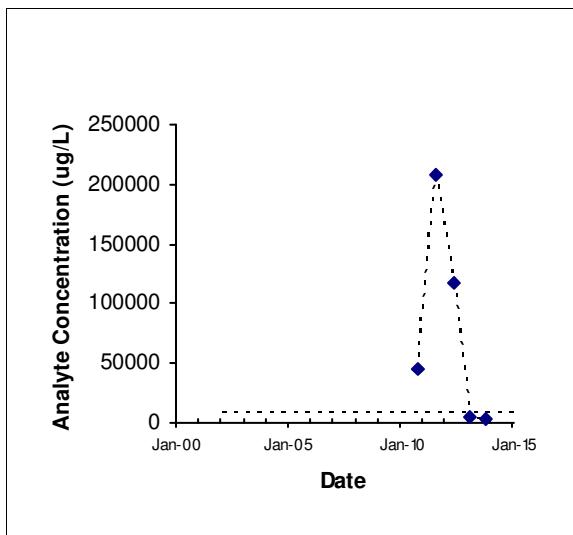
Analyte: Vinyl chloride Maximum 226

\* Nondetects shown as 0

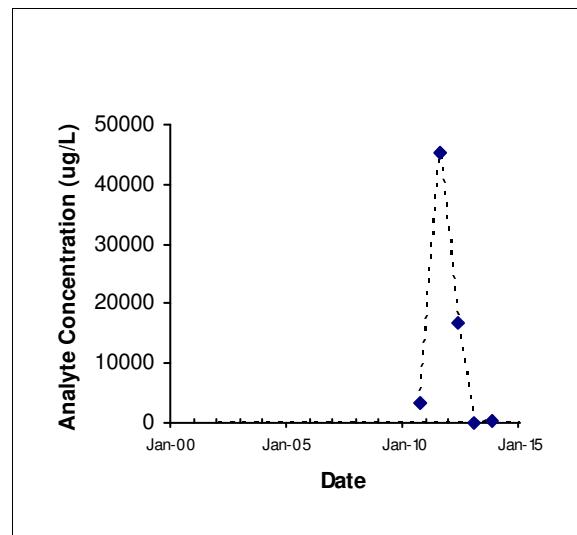
Pore Water Clean-Up Levels shown as -----

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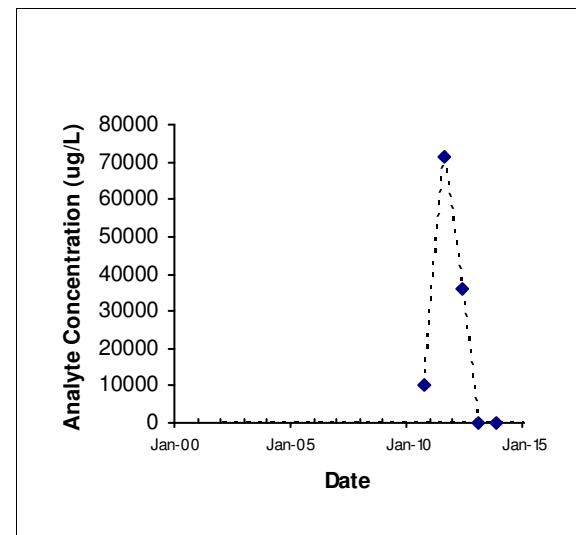
**Figure 2**  
**MW077**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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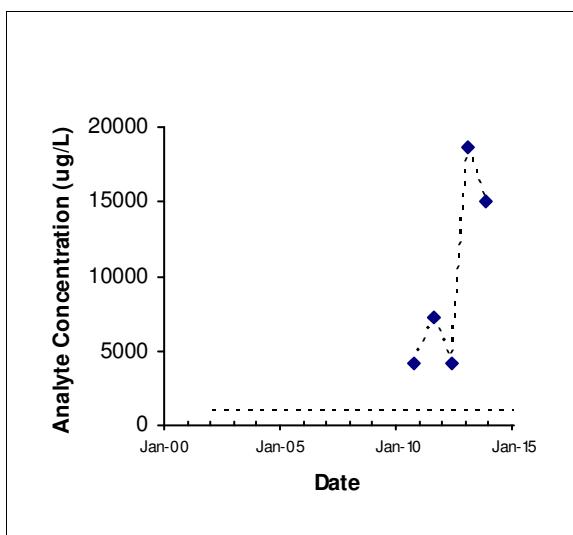
Analyte: 1,2-Dichloropropane      Maximum      208000



Analyte: Benzene      Maximum      45300



Analyte: TCE      Maximum      71300



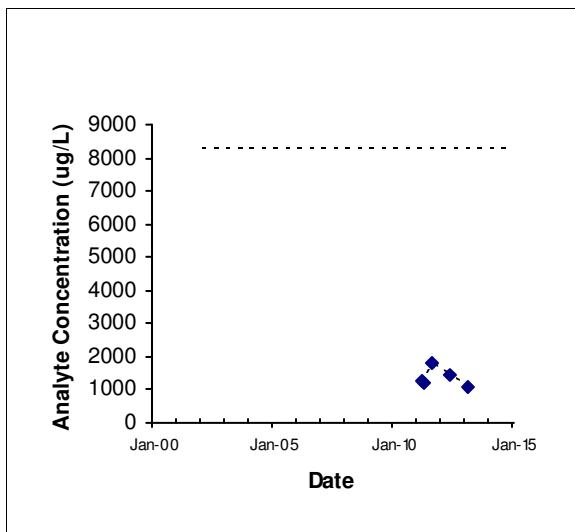
Analyte: Vinyl chloride      Maximum      18600

\* Nondetects shown as 0

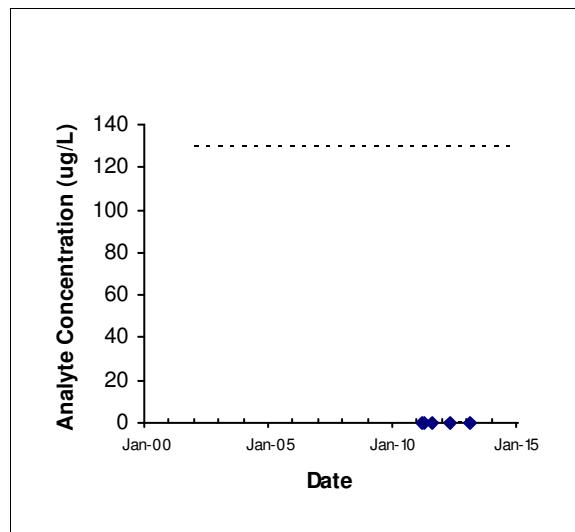
Pore Water Clean-Up Levels shown as -----

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mspence; 29-Apr-2014 15:34

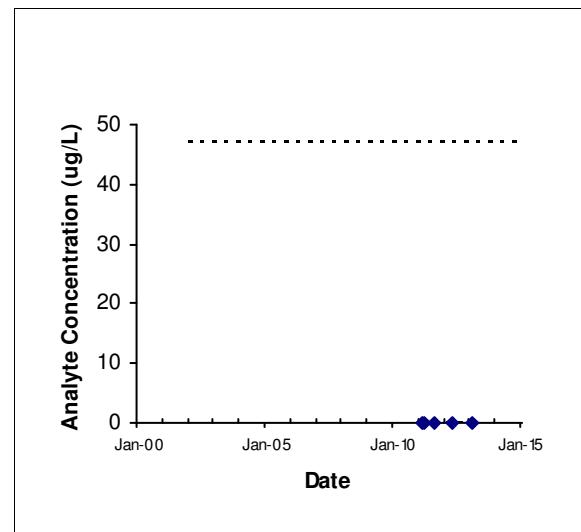
**Figure 2**  
**MW078**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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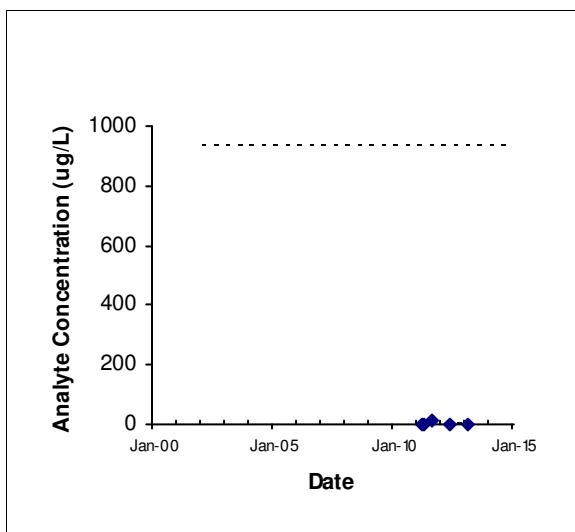
Analyte: 1,2-Dichloropropane Maximum 1810



Analyte: Benzene Maximum 0



Analyte: TCE Maximum 0



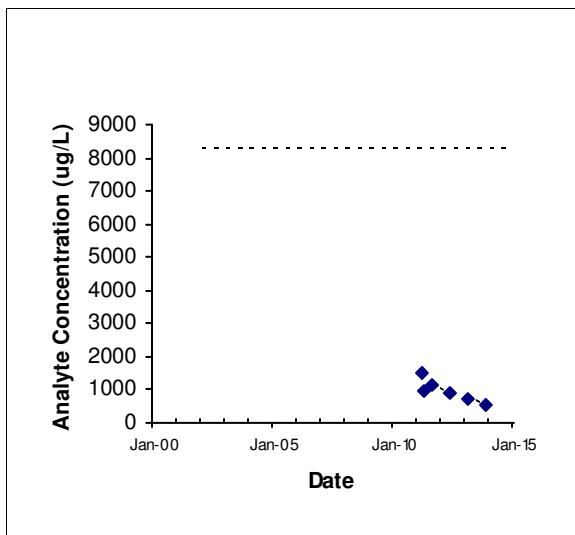
Analyte: Vinyl chloride Maximum 11.5

\* Nondetects shown as 0

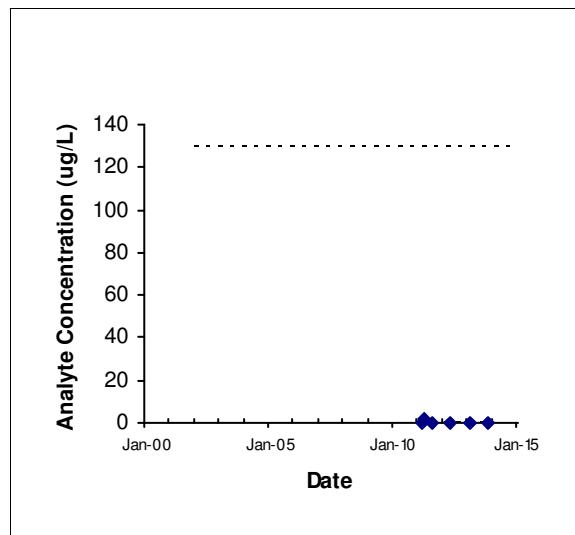
Pore Water Clean-Up Levels shown as -----

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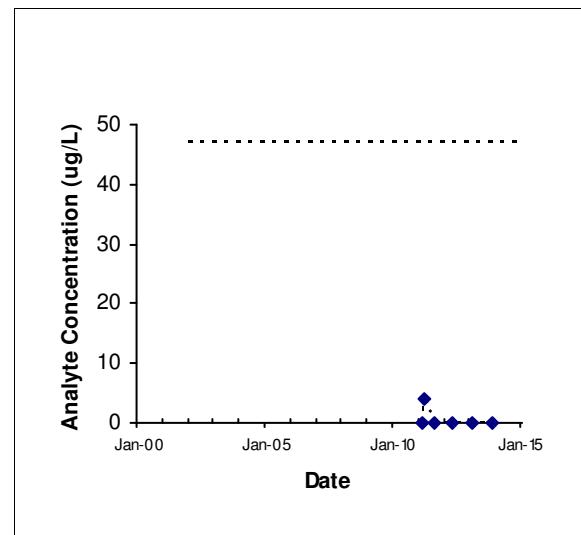
**Figure 2**  
**MW093**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**



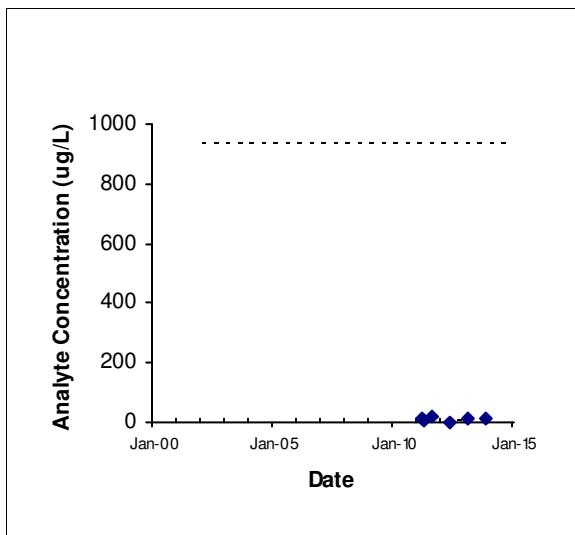
Analyte: 1,2-Dichloropropane      Maximum      1540



Analyte: Benzene      Maximum      2.1



Analyte: TCE      Maximum      4.1



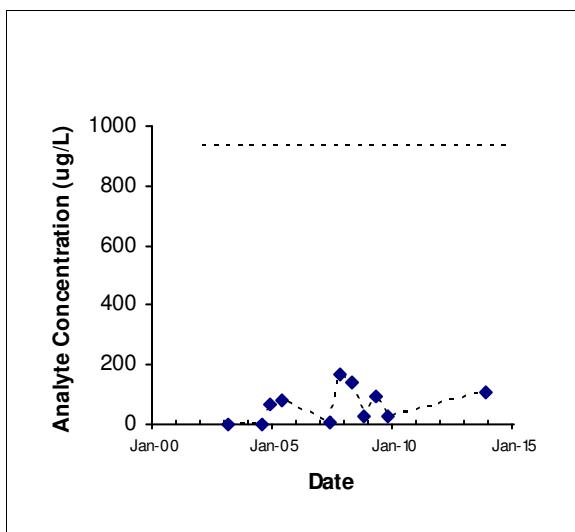
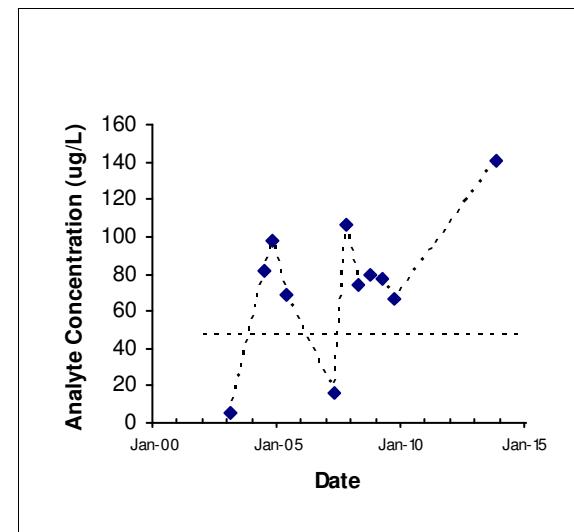
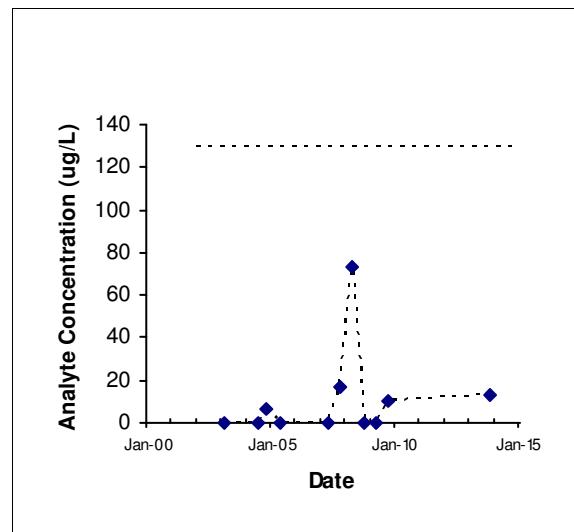
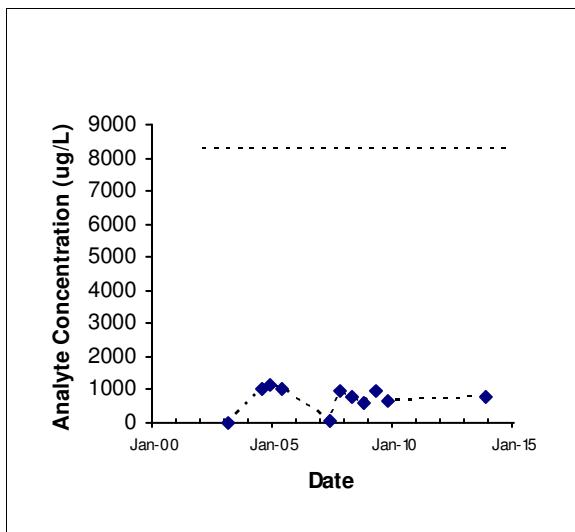
Analyte: Vinyl chloride      Maximum      16.8

\* Nondetects shown as 0

Pore Water Clean-Up Levels shown as -----

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**Figure 2**  
**MW094**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**



Maximum 1170

Maximum 72.9

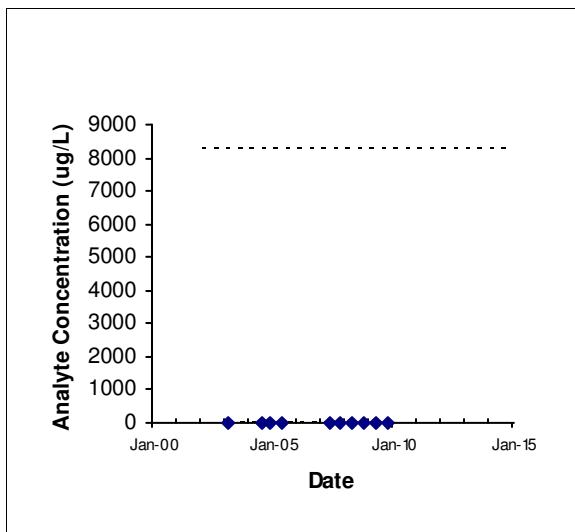
Maximum 141

\* Nondetects shown as 0

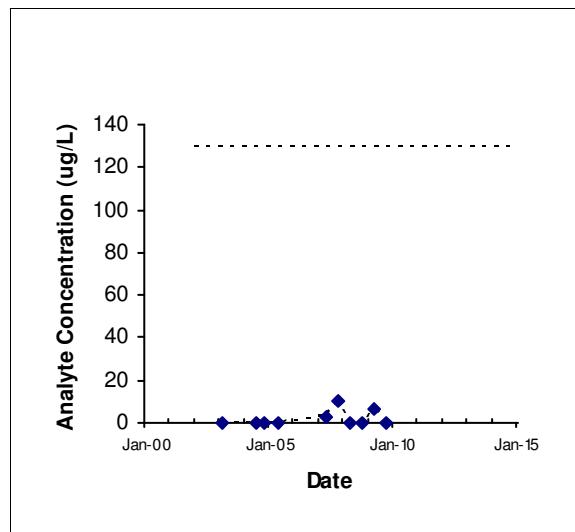
Pore Water Clean-Up Levels shown as -----

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mspence; 29-Apr-2014 15:34

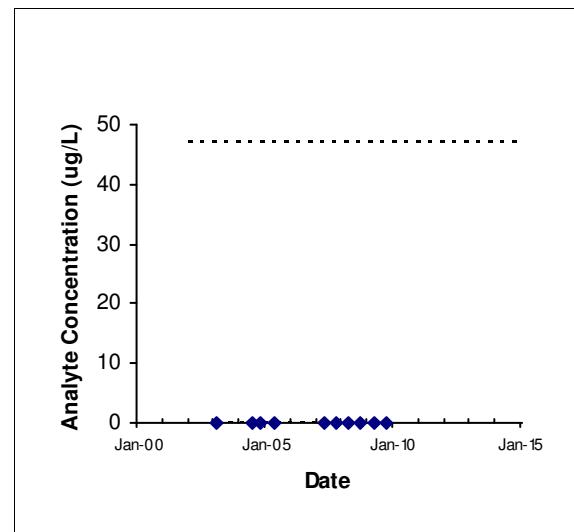
**Figure 2**  
**PZ034**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**



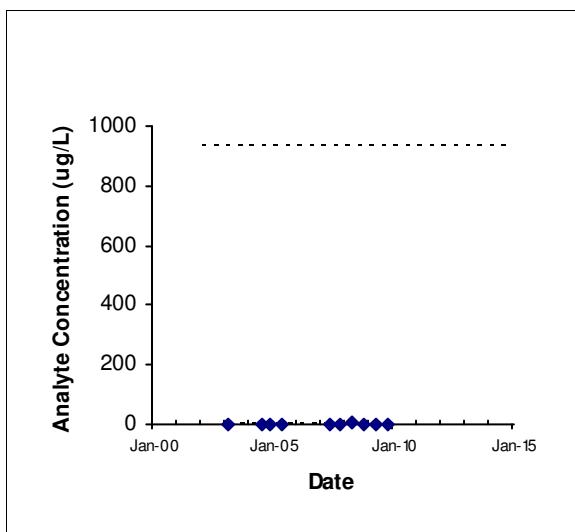
Analyte: 1,2-Dichloropropane Maximum 1.88



Analyte: Benzene Maximum 10



Analyte: TCE Maximum 0



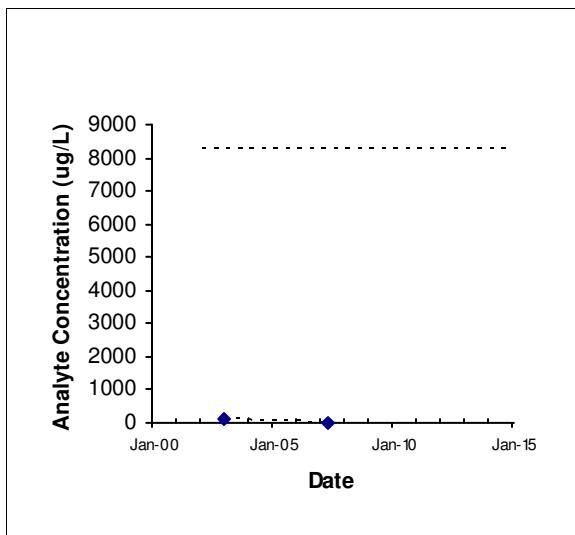
Analyte: Vinyl chloride Maximum 3.52

\* Nondetects shown as 0

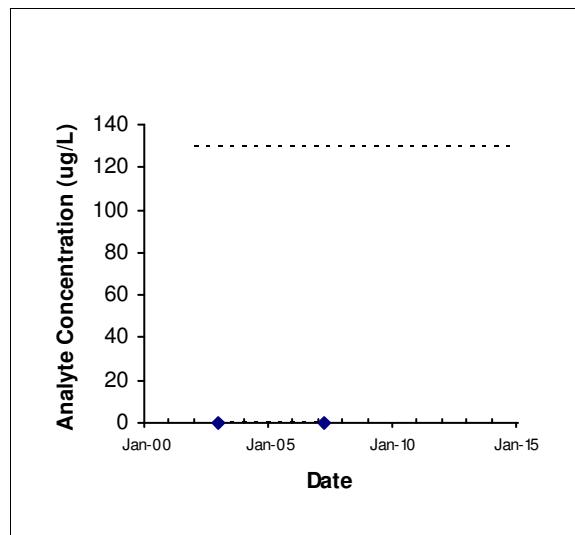
Pore Water Clean-Up Levels shown as -----

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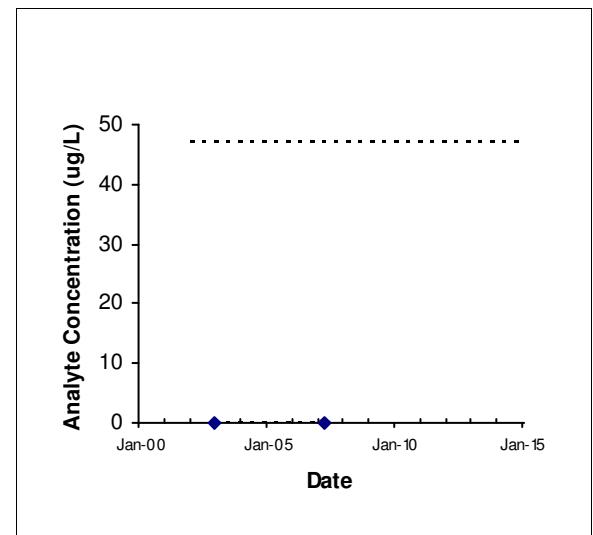
**Figure 2**  
**PZ036**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**



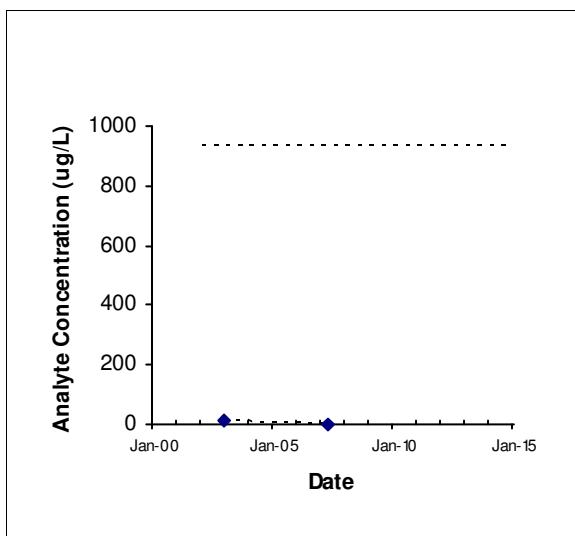
Analyte: 1,2-Dichloropropane Maximum 133



Analyte: Benzene Maximum 0



Analyte: TCE Maximum 0



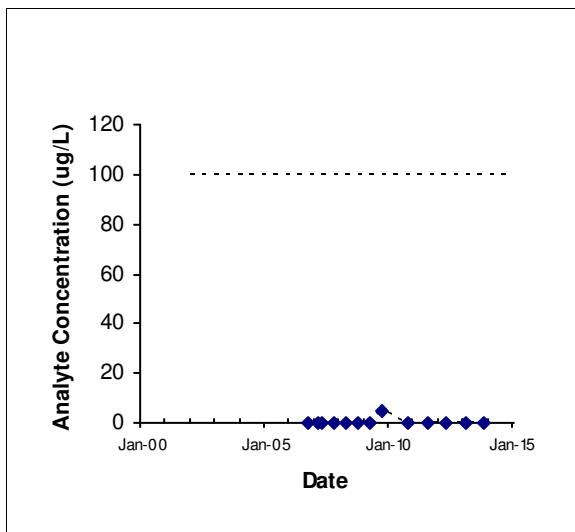
Analyte: Vinyl chloride Maximum 11.1

\* Nondetects shown as 0

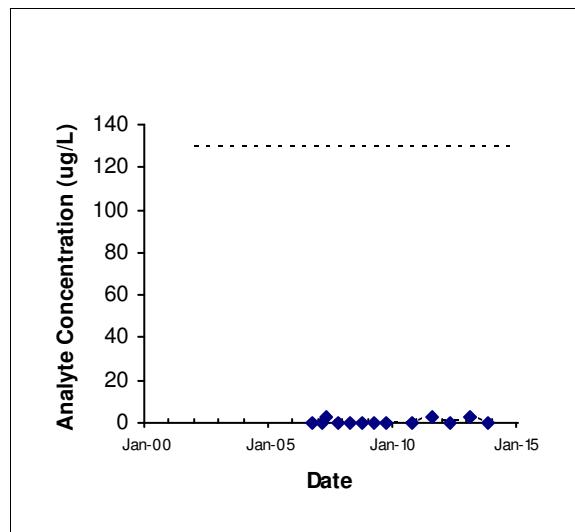
Pore Water Clean-Up Levels shown as -----

Z:\DOW\DO\_WVO\Reports\DataRequests\SCF\DoWVOWExceedenceTimeplot(SCF\_MM\_CLH\_B82\_20140306.mdb;  
rptTimeSeries  
mspence; 29-Apr-2014 15:34

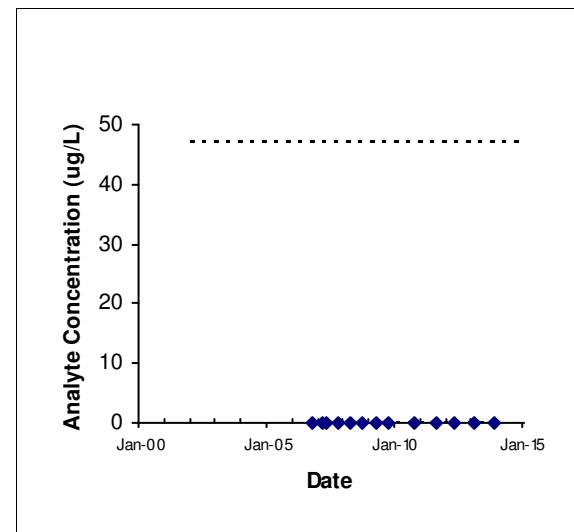
**Figure 2**  
**PZ037**  
**Chlorhydrin Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**  
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Analyte: 1,2-Dichloroethane      Maximum      5.11



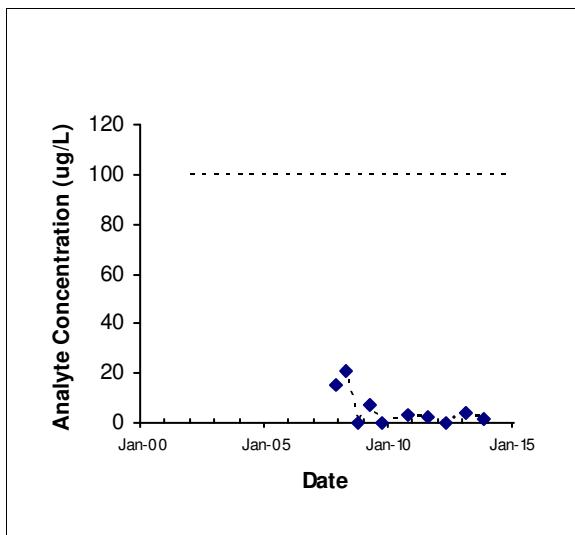
Analyte: Benzene      Maximum      3.17



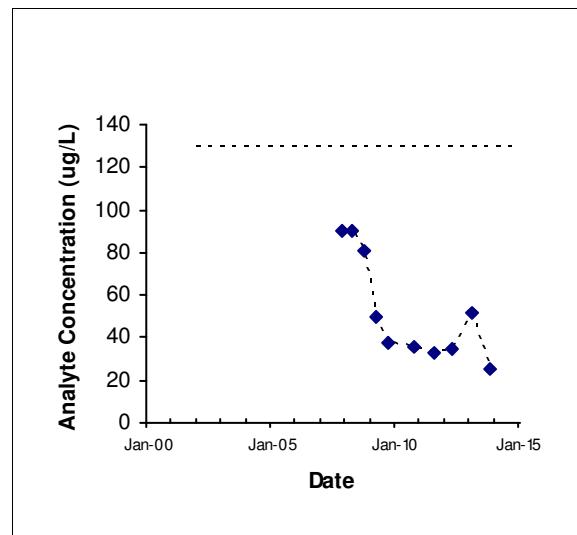
Analyte: TCE      Maximum      0

\* Nondetects shown as 0

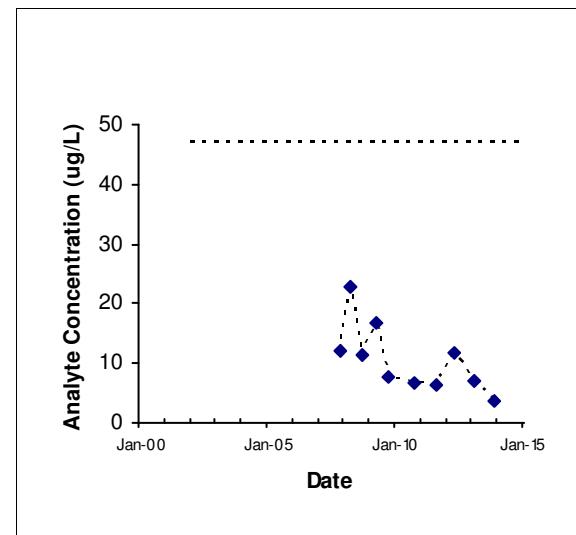
Pore Water Clean-Up Levels shown as - - - - -



Analyte: 1,2-Dichloroethane      Maximum      21.2



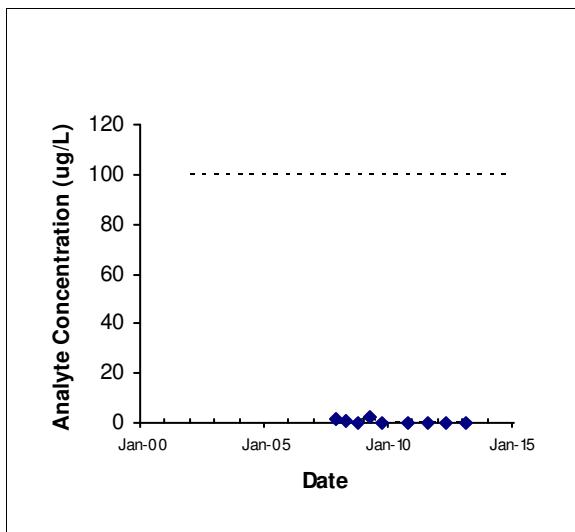
Analyte: Benzene      Maximum      90.5



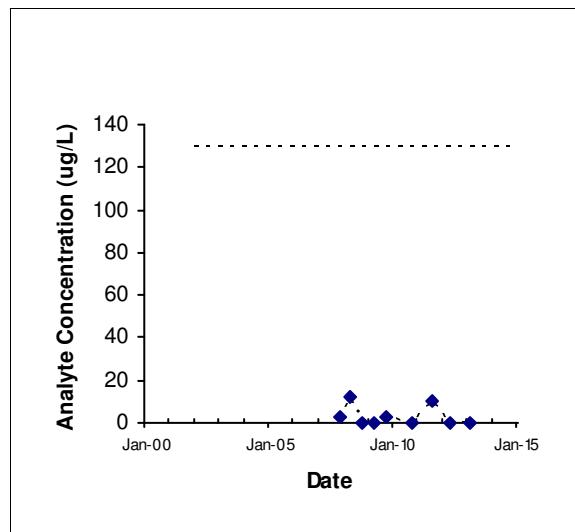
Analyte: TCE      Maximum      22.9

\* Nondetects shown as 0

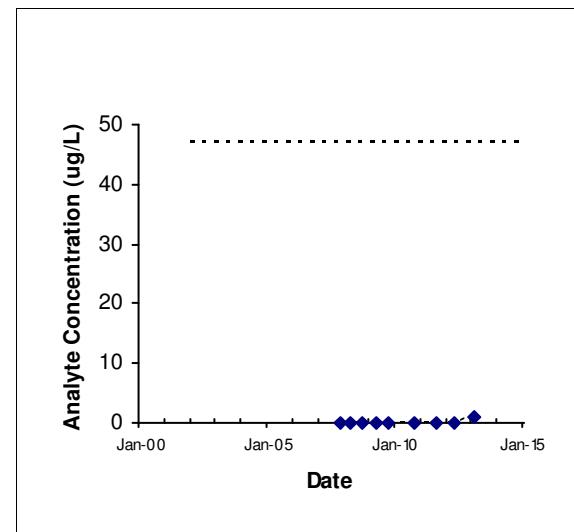
Pore Water Clean-Up Levels shown as - - - - -



Analyte: 1,2-Dichloroethane      Maximum      2.04



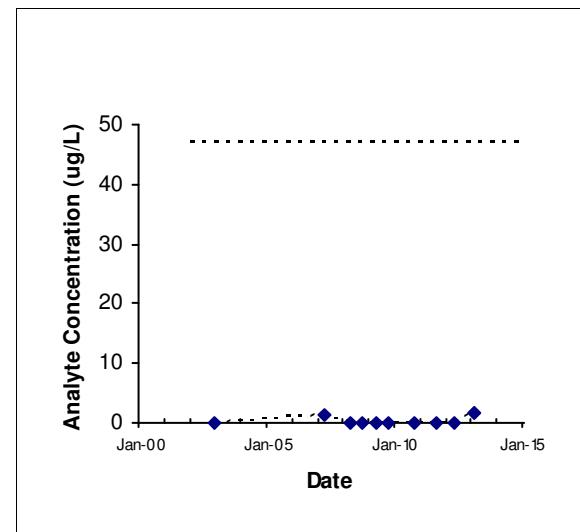
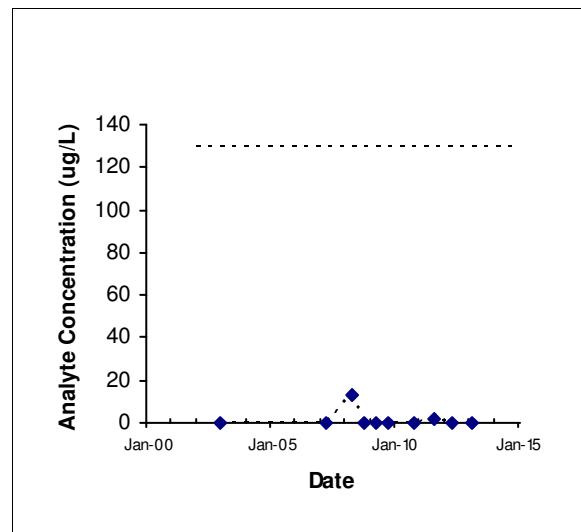
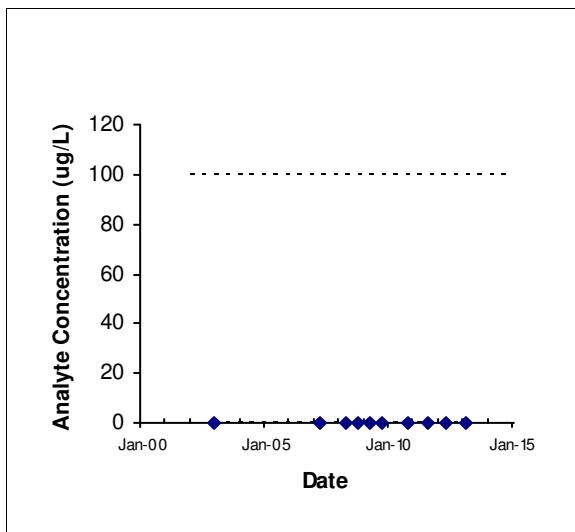
Analyte: Benzene      Maximum      12.3



Analyte: TCE      Maximum      1.15

\* Nondetects shown as 0

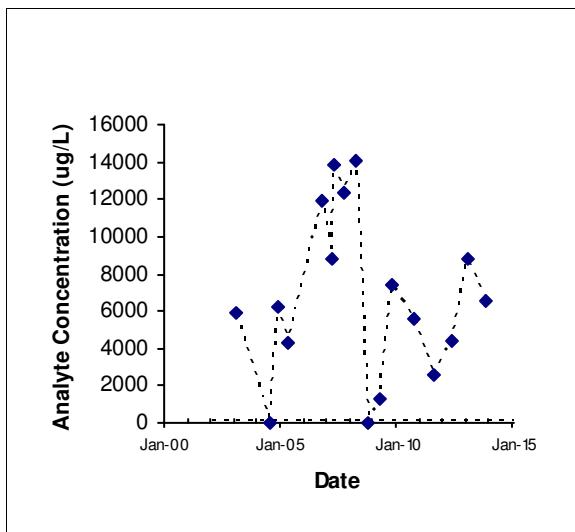
Pore Water Clean-Up Levels shown as - - - - -



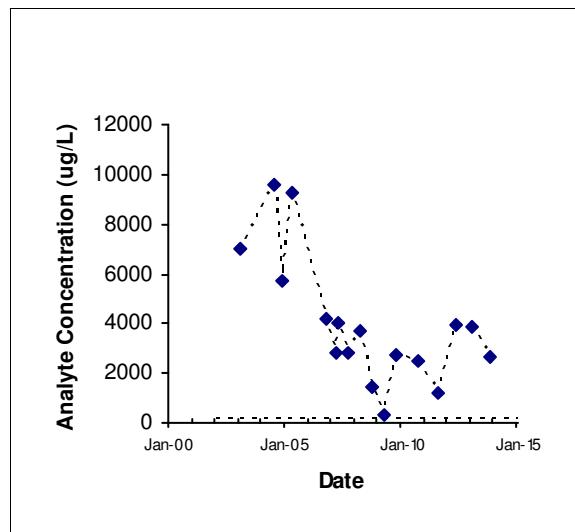
\* Nondetects shown as 0

Pore Water Clean-Up Levels shown as - - - - -

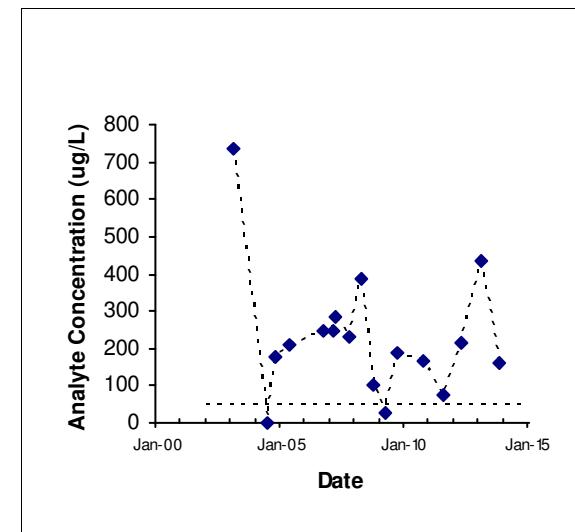
**Figure 1**  
**PZ030**  
**Middle Mainland Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**



Analyte: 1,2-Dichloroethane Maximum 14100



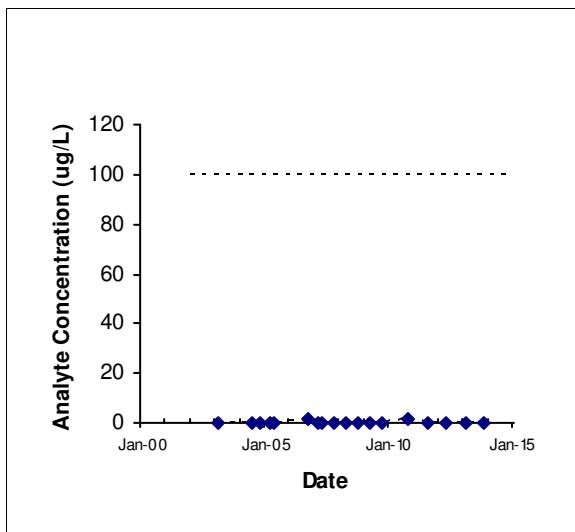
Analyte: Benzene Maximum 9550



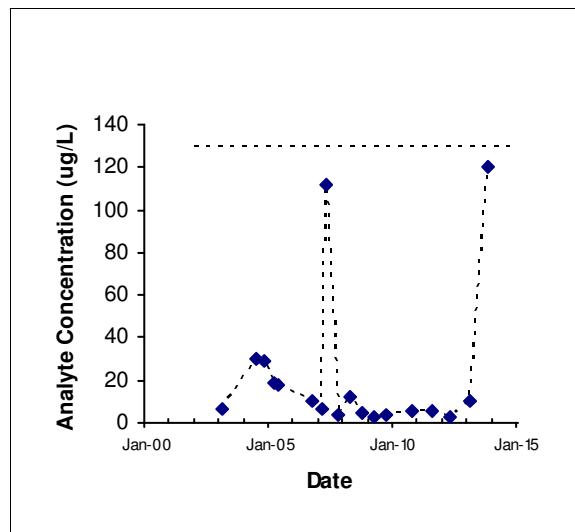
Analyte: TCE Maximum 734

\* Nondetects shown as 0

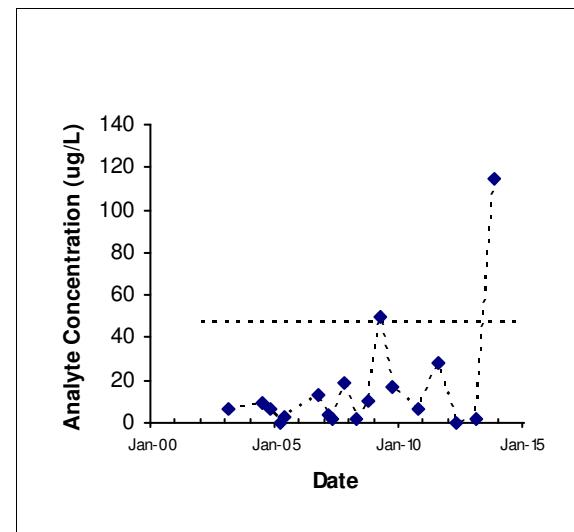
Pore Water Clean-Up Levels shown as -----



Analyte: 1,2-Dichloroethane      Maximum      1.26



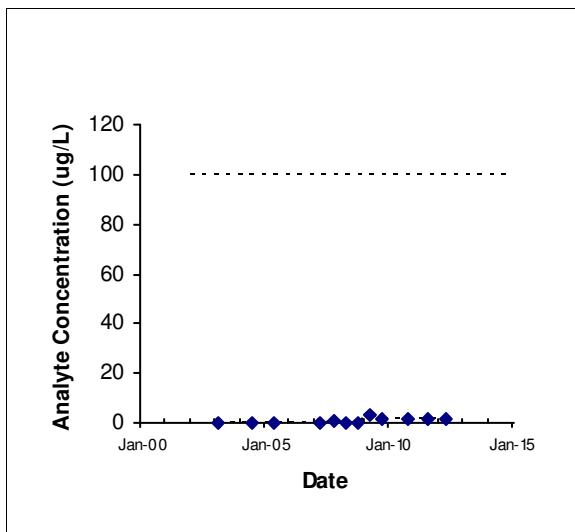
Analyte: Benzene      Maximum      120



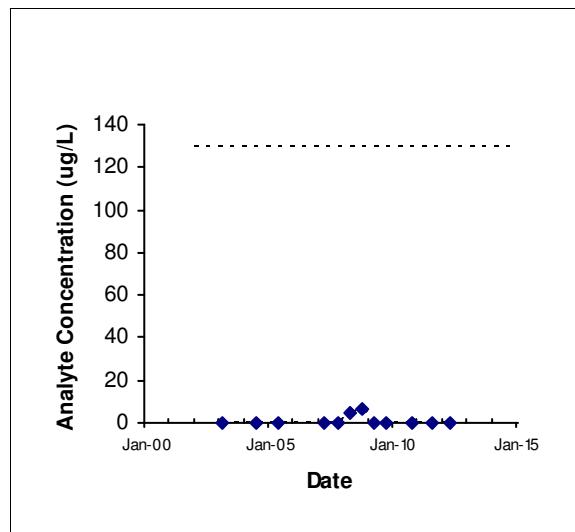
Analyte: TCE      Maximum      115

\* Nondetects shown as 0  
Pore Water Clean-Up Levels shown as - - - - -

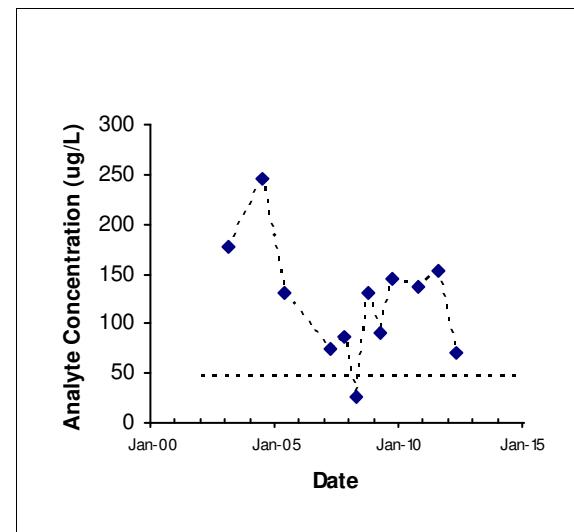
**Figure 1**  
**PZ032**  
**Middle Mainland Remediation Area**  
**Chemical Time Series Plots**  
**Zone: SCF**



Analyte: 1,2-Dichloroethane      Maximum      3.21



Analyte: Benzene      Maximum      6.84



Analyte: TCE      Maximum      246

\* Nondetects shown as 0

Pore Water Clean-Up Levels shown as - - - - -

